Chapter 2
Alternatives, Including the Proposed Action/Proposed Project

This chapter includes an overview of the Environmental Water Account (EWA) program, a description of the alternatives formulation process, and detailed descriptions of the three alternatives. For purposes of CEQA, the technical characteristics of the proposed project are described in Sections 2.1 and 2.4.

2.1 EWA Program Overview

The EWA is a cooperative management program; the purpose of the EWA program is to provide protection to at-risk native fish species of the Bay-Delta estuary through environmentally beneficial changes in State Water Project (SWP)/Central Valley Project (CVP) operations at no uncompensated water cost to the Projects' water users. This approach to fish protection involves changing Project operations to benefit fish and the acquisition of alternative sources of project water supply, called the "EWA assets," which the EWA agencies use to replace the regular Project water supply lost by pumping reductions. The following EWA program overview is excerpted from the CALFED Programmatic Record of Decision (CALFED ROD; provided in Appendix A of this EIS/EIR).

The EWA program consists of two primary elements: implementing fish actions that protect species of concern and increasing water supply reliability by acquiring and managing assets to compensate for the effects of these actions. Actions that protect fish species include reduction of pumping at the SWP and CVP export pumping plants in the Delta. Project export pumping varies by season and hydrologic year and can adversely affect fish at times when fish are near the pumps or moving through the Delta. Pumping reductions can reduce water supply reliability for the SWP and CVP Export Service Area, causing conflicts between fishery and water supply interests. A key feature of the EWA is use of water assets to replace supplies that are interrupted during pumping reductions. The EWA assets can also provide other benefits such as augmenting instream flows and Delta outflows.

The CALFED agencies established an EWA to provide water for the protection and recovery of fish beyond that which would be available through the existing baseline of regulatory protection. The EWA involves neither new sources of water nor new construction.

2.1.1 EWA Actions to Protect and Enhance Fish

The SWP and CVP export Project water through the Delta pumping plants. This pumping can change flow patterns within the Delta, and the pumps can entrain and kill fish at the intakes to the SWP and CVP pumping facilities when fish are moving through the Delta. The EWA agencies take actions to protect and restore Delta at-risk

native fish species and provide additional benefits upstream. EWA actions in the Delta to protect fish can involve temporary pumping reductions at the Delta or closure of the Delta Cross Channel gates (see Section 2.1.4.2). Closing the gates at the Delta Cross Channel, a channel constructed to increase Sacramento River flow into the Central Delta, improves the survival of anadromous fish migrating through the Sacramento River because it helps fish migrate out to the Bay instead of traveling into the central Delta. Agency biologists use real-time data on fish abundance, flow, and fish salvage at the Delta pump intakes to develop recommendations for fish protection. Actions to provide secondary benefits include increasing instream flows in rivers upstream from the Delta or augmenting Delta outflows.

The EWA seeks to benefit fish species that spend some portion of their life cycle in the Delta. The fish species of concern, their life stages, and location in the Delta are described in Chapter 9 and the ASIP.

2.1.2 Asset Development

The EWA agencies take actions to protect fish and the environment while compensating for the supply effects of these actions by acquiring EWA assets and then storing and moving the assets to where they are needed to compensate for fish actions. The CALFED ROD (CALFED 2000b) and Operating Principles Agreement (CALFED 2000c) stated that the Project Agencies would acquire and manage EWA assets in several ways:

- **Delta Operations:** altering Delta Project operations, when environmental conditions allow, to export additional water (also called variable assets);
- **Water Purchases:** purchasing water from willing sellers both upstream from the Delta and within the Export Service Area;
- **Stored Water:** purchasing stored water from the Export Service Area sources to be used as collateral for borrowing (released only when all other assets have been expended), and to function as long-term storage space after the water has been released;
- **Source Shifting:** delaying delivery of water to a Project contractor, who would use water from an alternative source until the water is paid back; and
- **Exchanges:** The Project Agencies may exchange EWA assets for assets of character, such as location, seasonality, or year-type, more suitable to EWA purposes.

2.1.3 Regulatory Commitments

The CALFED Multi-Species Conservation Strategy (MSCS) Conservation Agreement (CALFED 2000d) and the CALFED Biological Opinions included commitment by several CALFED agencies (USFWS, NOAA Fisheries, U.S. Bureau of Reclamation, Bureau of Land Management, U.S. Environmental Protection Agency, U.S. Army

Corps of Engineers, Natural Resources Conservation Service, the Resources Agency of California, California Department of Fish and Game, and the Department of Water Resources) that there would be no additional CVP or SWP export reductions from actions conducted to protect fish under the federal Endangered Species Act (ESA), California Endangered Species Act (CESA), or Natural Community Conservation Planning Act (NCCPA) beyond the regulatory baseline of fishery protection. This commitment was subject to specified conditions and legal requirements and extended for the first 4 years of CALFED Stage 1 implementation. This commitment is based on the conditions in Section VIII-B of the MSCS Conservation Agreement and the availability of three tiers of EWA assets:

- Tier 1 is baseline water, provided by existing regulations and existing operational flexibility. This baseline level of fishery protection consists of the biological opinions on winter-run salmon and delta smelt, 1995 Delta Water Quality Control Plan as implemented by SWRCB Decision 1641 and Order 2001-05, and 800,000 acre-feet of CVP Yield pursuant to the Central Valley Project Improvement Act (CVPIA) Section 3406(b)(2).

- Tier 2 consists of the assets in the EWA combined with the benefits of a fully funded Ecosystem Restoration Program (ERP) and would be an insurance mechanism that would allow water to be provided for fish when needed without reducing deliveries to water users. Tier 1 and Tier 2 would be, in effect, a water budget for the environment and would be used to avoid the need for Tier 3 assets.

- Tier 3 consists of assets beyond Tiers 1 and 2 and would be based upon the commitment and ability of the CALFED agencies to make additional water available should it be needed. It would be unlikely that assets beyond those in Tier 1 and Tier 2 would be needed to meet ESA requirements. If further assets were needed, however, the third tier would be provided in specific circumstances. To determine the need for Tier 3 assets, the fishery agencies would consider the views of an independent science panel. Tier 3 measures would be used only when Tier 1 and Tier 2 measures are insufficient to avoid jeopardy, as determined by the USFWS or NOAA Fisheries. The USFWS and NOAA Fisheries define jeopardy as a situation in which an action is likely to jeopardize the continued existence of a species listed as endangered or threatened under the ESA. If USFWS and NOAA Fisheries trigger Tier 3, measures could include increased EWA acquisitions or uncompensated fish actions (CALFED 2002b).

2.2 Alternative Formulation

The California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) require that environmental documents identify and analyze a reasonable range of feasible alternatives that could meet the project objectives to varying degrees. Under CEQA and NEPA, the range of potential alternatives to the proposed project shall include those that could feasibly accomplish most of the basic purpose and need, and objectives of the project. In addition, CEQA requires an alternative that could avoid or substantially lessen one or more of the significant

effects. NEPA and CEQA require that a reasonable range of alternatives, including a no-project/no-action alternative be analyzed.

The development of alternatives presented in this document was an iterative and collaborative process involving representatives from Reclamation, DWR, USFWS, NOAA Fisheries, and CDFG. These agencies worked together to interpret the CALFED ROD definition of the EWA while considering a range of possible EWA alternatives. The agencies also held public scoping meetings to solicit additional EWA alternatives. The purpose and need statement (Section 1.2.1) formed the basis for the determination and evaluation of alternatives under NEPA. The project objectives (Section 1.2.2) formed the basis for determination and evaluation under CEQA. Section 2.2.1 presents the alternatives considered and eliminated from detailed analysis, along with the reasons why the alternatives would not address the EWA purpose and need and project objectives. Section 2.2.2 summarizes the process used by the agencies to define the alternatives subject to detailed analysis in this EIS/EIR.

The CALFED ROD for the PEIS/EIR identified an EWA as a part of the CALFED program. The CALFED agencies used a six-step public process to develop potential Bay-Delta solution options for the that were evaluated in the CALFED PEIS/EIR: identify problems; define objectives; identify actions; develop solution strategies; assemble alternatives; and refine alternatives. The process identified 50 categories of actions that would resolve Bay-Delta problems and achieve the four basic plan objectives to varying degrees. The action categories became the building blocks for the preferred alternative, which included programmatic actions grouped into eight basic plan elements: ecosystem restoration, water quality, water transfers, water use efficiency, watersheds, levee system integrity, storage, and conveyance. In addition, an innovative combination of plan elements, an EWA, was included in the CALFED ROD as one of the anticipated projects to implement the CALFED plan. Additional information about the alternatives development process for the CALFED PEIS/EIR can be found in the Final CALFED PEIS/EIR (CALFED 2000a), Chapter 2 and the CALFED PEIS/EIR, Responses to Comments, Volume 1, Common Response 5 (July 2000).

Because the CALFED PEIS/EIR did not address EWA actions at a project-specific level, this project-specific EIS/EIR evaluating all projected EWA actions through 2007, is required. The preparation of the EWA EIS/EIR allows for further, more detailed evaluation of the actions described in the CALFED PEIS/EIR ROD.

2.2.1 Alternatives Not Carried Forward for Further Analysis

2.2.1.1 Screening Criteria for Alternatives

The selection of alternatives for detailed analysis was based on the ability of potential alternatives to meet the project purpose and need/CEQA project objectives, as is discussed in Section 1.2. An emphasis in screening the alternatives was also placed on the three primary considerations related to the ongoing water conflict at the Delta pumps: timeliness, flexibility, and reliability. That is, alternatives selected for detailed analysis needed to be immediate, flexible, and reliable, as described below.

- **Immediate.** Conflict at the pumps was an ongoing problem that required an immediate solution to meet both water supply needs and environmental protection requirements. Water agencies, water users, and resource agencies could not wait for the construction of new facilities or planned changes in water uses.

- **Flexible.** Any action taken to reduce the pumping conflict would need to take advantage of multiple means of water purchase, storage, and release, using spatial and temporal variation to provide water when it was most needed. Flexible water assets could be acquired from any entity and transferred to any entity connected to the Project systems to prevent interruption of water supplies.

- **Reliable.** Reliability is important for water users. Historic conflicts at the pumps created uncertainty for users because fish presence near the export pumps could cause unexpected reductions in pumping, and these reductions could affect water supply. Alternatives must increase supply reliability for urban, agricultural, and environmental users in the Export Service Area.

2.2.1.2 Alternatives Eliminated from Detailed Evaluation

This section describes alternatives considered but eliminated from detailed analysis based on the purpose and need consideration for timeliness, flexibility, and reliability.

EWA scoping sessions identified a number of methods that could reduce the conflicts at the Delta export pumps. The EWA agencies developed additional suggestions and formulated the following set of alternatives to the EWA:

- Desalination in Southern California;

- Increased use of Colorado River water;

- Water use efficiency within the Project service area;

- Additional water sources, including new or increased capacity of storage facilities, new conveyance facilities, or "water bladders" to transport water to southern California;

- Isolated facility; and

- Delta infiltration galleries to eliminate surface diversions to pumps.

2.2.1.2.1 Desalination in Southern California

California has over 150 desalting plants (DWR 1998) that create freshwater from brackish groundwater, municipal and industrial wastewater, and seawater. Desalination plants can be designed using several available technologies, including reverse osmosis (water is forced through a membrane through which salt cannot pass) and distillation (saline water is heated into steam and is then condensed). Increasing the number of desalination plants in the Projects' service area could provide an alternate water supply to Delta exports and decrease demand for pumping water

from the Delta. However, designing, permitting, and constructing these facilities would require many years. Desalination could not be implemented immediately.

Desalination facilities would need to go through an environmental review and permitting process before construction. Desalination plants have several potentially significant environmental impacts, including those associated with producing additional power and disposal of the brine byproduct. The environmental review process would be complicated by the potential impacts and would likely take more than 1 year. Similarly, design and construction would take several additional years. Desalination may be part of the overall solution to the State's water needs; however, the time requirements to permit, design, and construct a desalination facility prohibit it from being an immediate solution to reducing Delta conflicts, so desalination was not carried forward in the analysis.

2.2.1.2.2 Increased Use of Colorado River Water

The South Coast hydrologic region (encompassing the coastal area from Ventura County south to the border of Mexico) imports water from the Colorado River and receives SWP supplies from the Delta. The Colorado River currently supplies about 25 percent of the region's water (DWR 1998); additional Colorado River supplies could offset the need for some Delta water. Reducing Delta demands would reduce the amount of water that the SWP would need to pump through the Delta, which could alleviate some conflicts at the export pumps.

The Law of the River determines water supply apportionment and includes the Colorado River Compact, several major court decisions, and a number of statutes involving seven states (DWR 1998). Although California's basic Colorado River apportionment is 4.4 million acre-feet (MAF), California has supplemented this amount in the past with unused apportionments from Arizona and Nevada, to use a total of 5.2 MAF. Because Arizona and Nevada have developed additional facilities to use their Colorado River apportionments, the amount of available supplemental water available to California has been reduced. The Department of the Interior asked California to reduce its use to the basic apportionment, which would require California areas dependent on the Colorado River to reduce their water demands or find alternate supplies.

California's Draft Colorado River Water Use Plan (May 11, 2000) proposed reduction in Colorado River use to 4.4 MAF by 2015. The Plan anticipated that California would be able to supplement its apportionment with surplus Colorado River water until 2015. Available surplus water would be allocated under the Colorado River Interim Surplus Guidelines (Reclamation 2001). Under these Guidelines, the California Colorado River contractors were expected to execute the Quantification Settlement Agreement (and its related documents) among the Imperial Irrigation District, Coachella Valley Water District, the Metropolitan Water District, and the San Diego County Water Authority by December 31, 2001. In the event the agreement was not executed by December 31, 2002, the interim surplus deliveries made under the Guidelines were to be suspended.

The California Colorado River contractors were unable to execute the Quantification Settlement Agreement by December 31, 2002. Consequently, delivery of surplus water to California Colorado River contractors was immediately suspended, and delivery of Colorado River water to California was immediately restricted to its legal appropriative limit of 4.4 MAF.

Even if the surplus were requested, other water agencies have rights to that surplus water, and the EWA would unlikely be able to obtain supplies from this source. Consequently, Colorado River supplies are not considered a viable option for developing increased water supplies to reduce conflict at the Delta pumps as an alternative to the EWA. As a result, this alternative was not carried forward in the analysis.

2.2.1.2.3 Funding Water Use Efficiency Measures

Water Use Efficiency is one of eight elements of the CALFED plan. Urban water conservation actions include installation of improved water efficiency plumbing fixtures, water metering, and improved landscape irrigation, among others (DWR 1998). Agricultural water conservation methods also include improving irrigation management and water delivery systems, especially high-volume gravity flow systems that deliver large amounts of water. Canal liners, piping in farm distribution systems, and tail water and spill recovery systems also aid in agricultural water conservation. Agricultural land retirement in impaired drainage areas qualifies as an agricultural conservation method as well. The Water Use Efficiency Program Plan describes the potential actions, including the possible efficiency gains that can be expected under the CALFED plan.

The CALFED ROD established that both water use efficiency measures and the EWA are necessary components of the CALFED plan and the Water Management Strategy. The Water Use Efficiency Program Plan establishes a goal for aggressive implementation of agricultural and urban water use efficiency actions beyond pre-existing programs, but these measures are not a substitute for the EWA. The estimated water use efficiency gains under the CALFED plan will be achieved over time and will take several years to identify, plan, coordinate with local water users, and implement, and will therefore not be realized during the EWA timeframe. Further, to meet the objectives of the EWA, water use efficiency measures beyond those proposed in the CALFED plan would likely be necessary. Additional measures would not be achievable during the EWA timeframe, and it may not be technically feasible to obtain more efficiency gains than predicted in the Water Use Efficiency Program Plan. Water use efficiency measures on their own would potentially result in less flexibility in operating the SWP and CVP pumps and create more difficulty for the Project Agencies to respond to drought conditions or unexpected behavior by the fish species of concern. Finally, the water supply benefits of water use efficiency measures are often spatially and temporally diffuse, unpredictable, and difficult to control centrally in a manner necessary to achieve the EWA objectives.

2.2.1.2.4 New Water Sources

Other alternative sources for "new water" in the CALFED plan for the EWA and other beneficial uses include increasing storage capacity in existing reservoirs and aquifers and constructing new conveyance mechanisms. Increasing storage capacity in surface reservoirs and underground aquifers could provide water to meet the needs of California's growing population and provide California flexibility to improve water quality and restore ecosystems. Capacity enlargement and new storage projects under consideration by the CALFED agencies include:

- Enlarging Shasta Lake;
- Enlarging Los Vaqueros Reservoir;
- Constructing North-of-the-Delta Upstream Storage;
- Constructing In-Delta Storage;
- Augmenting Upper San Joaquin River Storage; and
- Employing groundwater storage and conjunctive use operations.

The Integrated Storage Investigation (ISI) is evaluating the above-mentioned storage projects. Investigations will serve as an important opportunity to prepare a comprehensive assessment and evaluation. DWR and Reclamation continue working with local agencies to explore specific groundwater banking and conjunctive use opportunities.

Construction of new conveyance facilities is another potential action to increase the capacity of the SWP and CVP and would give the Projects greater flexibility to accommodate fishery protection actions in the Delta. The CALFED plan incorporated several conveyance projects to improve through-Delta conveyance of water. Some of these projects may be completed during the EWA timeframe and could provide benefits similar to the EWA; however, the ROD established that both the EWA and these conveyance improvements were necessary components of the CALFED plan and the Water Management Strategy. Additional conveyance improvements beyond those identified in the CALFED plan would need to be constructed to provide the additional benefits of the EWA. Additional conveyance improvements can reasonably be expected to take even longer to design, permit, and implement than those already included in the CALFED plan; therefore, the benefits of such actions would be well beyond the immediate EWA timeframe (CALFED ROD, p. 48-49).

2.2.1.2.5 Move Water with Water Bladders

Importing water into the South Coast region in 100-foot-wide nylon bags called "water bladders" would be another potential means to offset SWP demand for Delta water and reduce conflicts at the pumps. Floating "water bladders" behind tugboats to southern California could provide a reliable source of water for Project water users. A recent proposal involves transferring rainy season water from the Gualala and Albion Rivers to San Diego. The project proponent would install pipes at the mouths

of the Gualala and Albion Rivers, below the alluvial soil at the river bottoms. The project proponent withdrew the proposal on December 13, 2002, but it is possible that other entities would develop similar proposals. Installation of loading and unloading docks, pumps, and local treatment and distribution infrastructure and transfer mechanisms would require the project proponent to develop local support, which would likely extend the project timeframe beyond the immediate EWA timeframe (Locke 2002; Wood 2002; Bell 2002; Mendocino County Board of Supervisors 2002; Swartz 2002).

2.2.1.2.6 Isolated Facility

The CALFED PEIS/EIR analyzed an isolated diversion facility - a canal connecting the Sacramento River in the north Delta to the SWP and CVP export facilities in the south Delta. The isolated facility would have a fish screen at the point of diversion from the Sacramento River; the fish screen would reduce fish entrainment at the Delta pumps. Reduction in fish entrainment would reduce the need for EWA water.

The PEIS/EIR's preferred program alternative did not include the isolated facility, but instead focused on improving through-Delta conveyance capacity. If the through-Delta conveyance system does not work, CALFED agencies would determine whether another alternative was necessary at the end of Stage 1 of the CALFED program implementation. If it were reconsidered, years of scientific evaluation would be necessary to determine whether an isolated facility would be feasible. Evaluation, design, and permitting the facility would take longer than the EWA timeframe.

2.2.1.2.7 Delta Infiltration Galleries to Eliminate Surface Diversions to Pumps

Infiltration galleries tap into saturated water zones directly beneath riverbeds. The "gallery" consists of an open well on the riverbank that is connected to the riverbed by a horizontal perforated water collection pipe. The collection pipes would draw surface water from the channels into buried perforated pipes through gravity flow. Galleries can either be horizontally or vertically designed according to local conditions.

A series of infiltration galleries constructed along the West Canal and Old River could channel water into Clifton Court Forebay, effectively eliminating the need for the Clifton Court Forebay Inlet Structure. Bypassing the inlet structure forestalls the need to reduce pumping operations for fish protection. EWA water acquisition options would no longer be needed to reduce conflicts at the Delta export pumps, but this option would not provide other EWA benefits (such as instream flows, Delta Cross Channel gate closure, and Delta outflow).

Planning an infiltration gallery would require a feasibility study to analyze water quality and water demand, available space for construction of galleries, proximity to population centers and potential pollution sources, depth to the water table, and nature of material in the unsaturated zone. If the study found that the galleries would be feasible, then the design would include placement of pipes through the levee structure to protect the levee and Forebay integrity. This project would include planning, scheduling, and analysis of construction-related effects and associated land

conversion. The time required to produce the necessary analyses would extend beyond the immediate EWA timeframe.

2.2.2 Development of Alternatives Carried Forward for Further Evaluation

This section describes the evolution of the EWA alternatives carried forward for further evaluation. A collaborative process involving personnel from Reclamation, DWR, USFWS, NOAA Fisheries, and CDFG produced the EWA alternatives evaluated in this EIS/EIR. Each of the EWA action alternatives is required to include:

- Ranges of fish actions that would be possible, given the purchase limits;
- The quantity of water that would be purchased;
- CVP and SWP operational flexibility[1] dedicated to the EWA program;
- 500 cfs of pumping capacity at Banks Pumping Plant in July – September;
- An amount of groundwater storage capability; and
- A source shifting agreement.

The development of alternatives considered:

- The EWA guidance and framework described in the CALFED ROD that related to a need for immediate solutions using existing facilities, the description of the EWA, and the feasibility of meeting EWA program needs through implementation of other actions called for in the ROD (Section 2.2.2.1);
- The sources and mechanisms of conflict (Section 2.2.2.2); and
- The flexibility to respond to variability in environmental conditions and fish protection needs (Section 2.2.2.3).

The section below discusses how these factors affected the EWA alternatives development process. Section 2.2.2.5 describes the lessons learned about asset acquisition and management strategies during early EWA implementation that helped EWA agencies develop the final alternatives.

2.2.2.1 ROD Guidance and Framework

The EWA agencies reviewed the concepts considered by the larger group of agencies that developed the CALFED PEIS/EIR ROD. One of the critical conflicts identified in the PEIS/EIR was the conflict between threatened and endangered fish recovery/protection and water supply reliability reduced by pumping reductions (as

[1] Delta "operational flexibility" describes the ability of the Projects to alter pumping operations within the Delta, if fish and water quality conditions allow, to result in additional water or conveyance capacity for the EWA.

directed by Biological Opinions), an ongoing problem needing immediate attention. Although the objectives of the CALFED plan include improved water supply reliability coupled with environmental enhancement, the measures identified in the CALFED ROD to achieve these objectives will require additional planning and, in many cases, construction of facilities; thus, these measures are not an immediate solution to the fish protection/water diversion conflict (see Sections 1.4 and 2.2.1.2 for additional discussion of these measures).

When developing the ROD, the CALFED agencies evaluated the use of the existing CVP/SWP facilities and operations in addressing the fish protection/water diversion conflict in the short term and reviewed other water development and management programs under consideration both locally and regionally. These agencies determined that other elements of the water management strategy would not be able to address the conflict in the first years of the CALFED plan implementation. The intent of the CALFED agencies was to develop an EWA strategy to create a portfolio of water and operational capabilities, collectively referred to as EWA assets, which could be used to address this conflict. EWA assets would be acquired through the dedication of certain operational flexibilities of the CVP and SWP, by securing the ability to store and carry over assets, and by purchasing a quantity of water annually. The ROD provided initial direction for the acquisition of EWA assets and an estimate of the annual average quantity of water that would be available to EWA (up to 185,000 acre-feet per year). The specific CVP/SWP operational flexibilities dedicated to the EWA included:

- EWA will have a 50 percent share of SWP export pumping of (b)(2) water and ERP water from upstream releases;
- EWA will share the use of SWP pumping capacity in excess of the SWP's needs to meet contractor requirements[2] with the CVP on an equal basis, as needed (such use may be under Joint Point of Diversion provisions in the Project Agencies water right permits);
- EWA assets will include any water acquired through export/inflow ratio flexibility; and
- EWA will include exclusive use of 500 cubic-foot per second (cfs) increase in authorized Banks Pumping Plant capacity in July through September (from 6,680 to 7,180 cfs).

The CALFED ROD estimated that the EWA program would purchase an average of 185,000 acre-feet of water per year, with 35,000 acre-feet coming from areas upstream from the Delta[3] and 150,000 acre-feet from the export service area. The total average annual water quantity estimated to be available from purchases in the Upstream from the Delta Region, purchases in the Export Service Area, and CVP/SWP operational

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[2] This use would be pursuant to the Joint Point of Diversion provisions in the Project Agencies' water rights permits. For more information on Joint Point of Diversion, see Section 2.3.1.1 and 4.1.3.2.

[3] The upstream purchase quantity was the amount of water target for the first year; higher amounts were anticipated in subsequent years.

flexibility was 225,000 acre-feet per year. The ROD also identified that using operational flexibility in the Delta could provide additional conveyance capacity to the EWA by increasing the maximum EWA Delta exports. (The increase in 500 cfs capacity is available only in the summer and under most circumstances does not generate assets for the EWA; the capacity only provides assured conveyance for water purchased upstream. Only with excess conditions in the Delta in the summer will this tool provide an increment of new water for the EWA.)

The CALFED agencies also recognized the need to define how the EWA would be implemented within the operational constraints of the CVP and SWP, to define the responsibilities of the participating agencies, and to further describe the tools and capabilities needed to create a functional EWA. To meet this need, the EWA Operating Principles Agreement was executed and was included as an attachment to the CALFED ROD. The EWA agencies used the Operating Principles in the development of alternatives for this EIS/EIR.

The development of alternatives for the EWA EIS/EIR also included a reassessment of the strategies identified in the CALFED ROD to determine their feasibility to develop a project for addressing the pump conflict problem. This reassessment considered strategies from the CALFED plan for improving water supply reliability, quantity, and quality; management options (e.g., conservation); proposed structural projects; and proposed changes to Bay-Delta hydrodynamics that could address the pump conflict. In all instances, these projects were either still in the planning stages or have some degree of uncertainty regarding their completion during the Stage 1 period of the CALFED program. None of the proposed projects would address the pump conflict issue immediately.

2.2.2.2 Sources of Conflict

An understanding of the causes of conflict between CVP and SWP operations and fishery managers helped guide the development of alternatives. Variability and unpredictability of water supply and biological conditions are two key factors that weighed heavily in the creation of the EWA. The hydrologic conditions in California change dramatically from one year to the next, season-to-season, and sometimes day to day. Water managers must take full advantage of their capabilities to secure water supplies in wet conditions to meet the higher demands during dry conditions. For the operators of the CVP and SWP, this means that when water is available, upstream reservoirs are operated to maximize storage while maintaining flood control capability. Reservoir releases above those that can be captured and delivered to CVP/SWP contractors downstream cause a loss of water supply and create conflict. In the Delta, the Project export facilities are operated to maximize Export Service Area deliveries to CVP/SWP contractors and storage facilities in the export service areas. The approach to the use of Delta export facilities continues until storage facilities in the export service areas are filled or operators reach a level of confidence that they can be filled. The approach to management of upstream reservoirs and Delta export facilities is driven by the knowledge that conditions can change quickly and

dramatically. The loss of the opportunity to store or pump water when it is available creates conflict because of uncertainty regarding the recovery of foregone supplies under future conditions.

Fishery agency managers advise the CVP and SWP operators and others regarding the avoidance and minimization of project effects on key fish resources. Fish species in the Sacramento/San Joaquin rivers and Bay-Delta estuary have adapted to respond to the highly variable hydrologic conditions. Hydrologic changes often coincide with significant life history events for fish, such as initiation of migration or spawning. Hydrologic conditions also determine changes in the quantity and quality of habitats available to fish. Although the general timing of key life history events for the fish can be predicted, the specific timing each year is influenced by annually variable hydrologic events and the influences of human management on the system. Recent history has reflected the high variability in the timing and magnitude of hydrological and biological events that can influence fish resources and Project operations.

Historically, prescriptive measures to provide fishery management water, such as water quality standards and operational criteria, have been used to protect fisheries and other beneficial uses of Bay-Delta water. Instream flow recommendations, water temperature requirements, pumping thresholds based on the ratio of exports to inflow, water salinity standards, and minimum Delta outflow requirements are all examples of these prescriptive measures. The single greatest source of conflict has been the pumping reductions at the CVP/SWP Delta export pumps that are imposed when the number of fish entrained at the pumps reaches critical thresholds specified in incidental take statements in the existing regulatory baseline for fishery protection. When pumping reductions are needed, CVP/SWP water managers attempt to adjust Project operations to minimize the loss of export water supply. The development of EWA alternatives focused on resolving the conflicts at the pumps as a first priority, but also maintained the ability to support upstream actions beneficial to fish when and where possible and needed.

2.2.2.3 Flexibility, Reliability, and Managing Uncertainty

The flexibility of the EWA program was considered in the development of alternatives and in the evaluation of effects. Flexibility gives the EWA agencies the ability to respond to variability in hydrologic conditions, Project operations, fish needs, water market conditions, and budget constraints, and to provide protection to at-risk native fish species of the Bay-Delta estuary through environmentally beneficial changes in the operations of the CVP and SWP, that result in no uncompensated water cost to the Projects' water users.

The EWA alternatives needed to be compatible with the existing physical structures of the CVP and SWP Project facilities, because any alternative requiring new facilities cold not be implemented immediately. Although the CVP and SWP storage and service areas encompass much of California, the majority of California's water supply originates in watersheds upstream from the Delta. The existing CVP/SWP facilities collect and convey this water through the Delta to water contractors in the Export

Service Area. The first priority use of these facilities is to move CVP and SWP water from the Delta and upstream storage into the export service area. EWA assets purchased in areas upstream from the Delta can be moved only using dedicated summer capacity or the EWA's share of unused capacity at one or both of the pumping facilities. The amount of pumping capacity[4] available to the EWA effectively limits the amount of EWA water that can be purchased in areas that are upstream from the Delta.

The Delta export pumping capacity available to the EWA can vary from year to year; therefore, the EWA alternative development process considered a flexible asset acquisition and management strategy that takes advantage of CVP/SWP conveyance facilities and non-Project storage upstream from the Delta and elsewhere within the CVP/SWP areas. Effective management of EWA would require flexibility. For example, the EWA may need the ability to store purchased EWA assets upstream from the Delta until pumping capacity is available. At other times, the EWA may need the ability to convey assets according to the schedule on which purchased water is made available. Any alternative considered needed to address the Delta export pumping capacity available to the EWA program.

The EWA agencies could purchase, store, and use water in a variety of locations. Having access to a variety of CVP/SWP facilities would add flexibility by allowing for purchase, conveyance, storage, and release of EWA water assets according to varying schedules and needs. Use of CVP/SWP facilities would also give managers more control of the timing of EWA water releases to achieve instream habitat benefits and would provide for the conveyance of EWA water to replace contractors' water supply lost due to pump reductions.

The EWA Operating Principles Agreement added the concept of "functional equivalence" to the CALFED ROD acquisition measures to improve the flexibility in asset acquisition and management. Given the focus of EWA on facilitating export pump reductions, the EWA agencies defined functional equivalency to be determined by the volume of water needed to replace any Project water supply lost because of exports foregone as a result of a pumping reduction. This concept allows the development of annual purchase strategies that provide the EWA greater flexibility to respond to variability in hydrologic conditions, fish needs, availability of conveyance capacity and sources of water to purchase and to maximize the assets obtained with available funding. The EWA agencies considered two variations to water purchases described in the CALFED ROD: one alternative uses the unmodified purchase targets established in the ROD (150,000 acre-feet from the Export Service Area and 35,000 acre-feet upstream from the Delta), and the second alternative would use the concept of functional equivalency in the development of an annual purchase strategy.

[4] Delta pumping capacity is not simply limited by the size of the pumps, but also by regulatory limits on exports as described in Chapter 1 (e.g., fish protection requirements, the export/inflow ratio, and water quality requirements).

Flexibility also helps reduce uncertainties related to the annual quantity of water purchased. The ROD determined that the EWA would acquire an average annual quantity of 225,000 acre-feet of water plus conveyance capacity and storage facilities. These annual supplies were to be developed from both purchases (fixed assets) and the use of operational flexibility (variable assets). The volume of water that can be secured using operational flexibility (variable assets) will change each year as does the need, availability, and price of purchased supplies. Each year will be different from the next. Predicting the annual quantity of water to purchase so that it could be delivered when and where it was needed first requires knowledge of how much water was needed, and second where the water should come from.

The EWA agencies identified 600,000 acre-feet as a quantity of potential purchases for the EWA that may be needed in the most extreme case. This amount could be needed in the future for a combination of the following reasons:

1) The tools expected to produce variable amounts of EWA water each year have produced less water to date on average, relative to the anticipated average annual amount of 145,000 acre-feet. The CALFED ROD recognized that this amount would vary from year to year depending on hydrology; however, other circumstances affecting the amount obtainable have changed. There has been greater than expected use by DWR of Banks Pumping Plant pumping capacity in the spring to convey transfers to SWP contractors, thus precluding EWA use of some of this capacity to obtain EWA water and pay off debt. Because less CVPIA (b)(2) water is released upstream, the EWA share of this water that may be captured in the Delta by the SWP is reduced.

2) Under the concept of functional equivalency, SWP borrowing of up to 100,000 acre-feet has been substituted for the initial acquisition and long-term management of water equivalent to 200,000 acre-feet of storage within the Export Service Area because it has not been feasible to establish this asset. Only 100,000 acre-feet of this asset was expected to be used in any single year. If used, it would have to be replaced before it could be used again, but replacement would not necessarily have to occur in the next year. If the "borrowing" tool is used instead, any debt owed to the SWP under this arrangement may be carried into the subsequent year, when water could be purchased to extinguish a debt. Thus, for this tool to be truly equivalent to the stored water asset, the EWA needs the ability, when necessary, to purchase additional water up to the amount borrowed, not to exceed 100,000 acre-feet.

3) There has been a loss in the flexibility to manage the CVPIA (b)(2) water that contributed to the existing regulatory baseline of fishery protection. Providing the anticipated combined baseline and EWA benefits for fish may require additional EWA acquisitions.

4) EWA water purchase needs may increase in the future to address potential impacts of new facilities operations.

5) Water purchase amounts that may occasionally be needed for Tier 3, in the event that pumping effects on fish would be significant enough to justify pumping curtailments after EWA assets were exhausted, are included in this alternative.

The last factor considered by the EWA agencies concerns the constantly changing nature of water markets and effects that can occur by implementing a purchase. The volume of water that a willing seller may make available could change from year to year. The effects due to EWA water purchases are not necessarily based on the total volume purchased, but rather on the method by which the water is made available. The EWA could purchase previously stored surface water, surface supplies made available by groundwater substitution, previously banked groundwater, or surface supplies made available by crop idling. The locations vary throughout the two-valley region. Water asset acquisitions could be from a variety of different sources that are not necessarily interrelated.

The EWA agencies considered structuring alternatives around the water acquisition options (surface water, groundwater substitution, groundwater purchase, crop idling). Under this concept, different alternatives would have been eliminated, or restricted one or several of the water acquisition options. As noted above, however, not all years would have the same hydrology and fish actions, and not all acquisition options would be equally available each year. Any alternative that restricted the EWA to a limited set of purchase options might not be able to address the pump conflict in certain years if the EWA water acquisition options are either not available or restricted in some fashion. Therefore, the EWA agencies decided there must be an alternative that did not restrict the sources of EWA water asset acquisition options.

2.2.2.4 Basis for Alternatives Developed

The EWA agencies selected the two action alternatives carried forward because they best addressed the purpose and need, and project objectives, of the EWA and bracketed the potential range of effects that implementation of the program is expected to have. The two action alternatives: (1) are both based on the CALFED ROD; (2) take maximum advantage of the operational flexibility of both CVP/SWP facilities and facilities owned or controlled by willing sellers of water; and (3) adopt the concept of functional equivalency in asset acquisition and management. The two action alternatives address the immediate need to reduce the water supply reliability conflict at the Delta pumps and are flexible in maximizing the use of CVP/SWP facilities for asset management. The management options included in the alternatives do not interrupt water supply, and they achieve fishery protection and enhancement. The EWA agencies identified two action alternatives that could feasibly accomplish most of the stated project purposes and needs/project objectives and define the range of effects expected given the high degree of variability inherent to achieving the goals of the program; and, the two action alternatives could be implemented immediately.

2.2.2.5 Previous EWA Actions

In 2001, DWR tried to follow the ROD closely when negotiating asset acquisitions and use of non-Project facilities to manage assets.[5] From this experience, the Project Agencies reached the following conclusions about what an effective longer-term EWA would require to successfully operate.

- Upstream from the Delta water acquisitions are less expensive than acquisitions from the Export Service Area and could be used to produce secondary benefits, such as increased instream flows and Delta outflows.

- Storage may be difficult and expensive to obtain, but the SWP and CVP can help by providing unsecured loans to the EWA (in which a certain amount of water in CVP or SWP storage could be used for EWA actions before the EWA defined how the water would be repaid). Section 2.4.2.3.2 describes asset management.

- Source shifting should not be used unless the EWA cannot employ other assets, unless the price is affordable, or unless the Projects cannot permit the EWA to carry its debt beyond the date of the San Luis storage low point.

- Not all variable assets were available in the quantities estimated in the CALFED ROD. In some cases the quantities fell short of the estimates; in other cases, the actual acquired assets exceeded the CALFED estimates. These changes occurred because of changes in (b)(2) decisions and variable hydrology (see Section 2.4.2.2).

The Project Agencies concluded that more flexibility in purchases might help the EWA to be more efficient and effective. A flexible purchase approach was used during 2002, during which more water was acquired upstream from the Delta than in year one, and no storage agreements were enacted. During 2002 however, there were fewer fish near the export pumps, so less fish actions were needed and the flexible purchase strategy was not fully tested. A fixed purchase strategy and a flexible purchase strategy form the basis for the two EWA action alternatives.

2.3 No Action/No Project Alternative

The No Action/No Project Alternative describes the future conditions without EWA, defined as those CVP/SWP operational and environmental conditions that would reasonably be expected in the foreseeable future if the EWA program were not approved. The No Action alternative assumes the existing regulatory and legal

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[5] Because it was not able to purchase the 200,000 acre-feet of stored water on a long-term contract basis, DWR negotiated additional purchases, including a total of 105,000 acre-feet from upstream from the Delta sources, and in the export service areas acquired 159,000 acre-feet of stored groundwater. Reclamation contributed 72,000 acre-feet of water from the export service areas, giving the EWA total assets in 2001 of 374,000 acre-feet, after carriage losses. These purchases provided 100,000 acre-feet of water to account for the extractable portion of long-term storage that would have been available for use in one year. DWR made an agreement for source shifting for 100,000 acre-feet, with an additional option for 100,000 acre-feet.

constraints. This alternative also describes the conditions that would occur if the EWA did not receive funding in the future.

If the EWA were not implemented, actions to protect fish and benefit the environment would continue under the existing baseline of fishery protection, but the actions would be less than with the EWA. Compliance with the biological opinions (the baseline for fishery protection) would require pumping reductions, resulting in reduced CVP and SWP water deliveries. DWR and Reclamation would continue to attempt to re-operate the SWP and CVP, respectively, to avoid decreased water deliveries to export users. These actions are described below.

2.3.1 Actions to Protect Fish

2.3.1.1 Flow-Related Actions

The CALFED ROD identified a baseline level of fishery protection requirements for Project operations. Existing regulatory programs established these requirements prior to implementation of the CALFED ROD, and these programs alter Project operations in ways that improve Delta water conditions for fish. The No Action/No Project Alternative includes the environmental requirements identified below.

- **1993 Winter-run Biological Opinion (NOAA Fisheries).** In 1993, NOAA Fisheries assessed the potential effects of operations of the CVP and SWP on the Federally listed winter-run Chinook salmon. Based on this assessment, NOAA Fisheries issued a biological opinion concluding that operation of the CVP would likely jeopardize the continued existence of winter-run Chinook salmon. Reasonable and prudent alternatives to CVP operations were developed to avoid jeopardy, including specific flow, temperature, reservoir storage, and diversion requirements in the Sacramento River and in the Delta. NOAA Fisheries reinitiated consultation on CVP operations when the "Principles for Agreement" that formed the basis for the Bay-Delta Plan were originally signed. NOAA Fisheries subsequently issued a revised biological opinion in 1995. Reclamation currently operates the CVP in accordance with the NOAA Fisheries 1995 Winter-run Chinook Salmon Biological Opinion.

- **1995 Delta Water Quality Control Plan (1995 Delta WQCP) and SWRCB's Decision 1641.** The SWP and CVP met the flow-related objectives of this plan at the time the CALFED ROD was signed. The SWRCB has subsequently issued Decision 1641 (D-1641), which provided a decision regarding the obligations of the SWP and CVP to meet the flow-related objectives in the Water Quality Control Plan. Section 1.5.2.5 contains additional information on the 1995 Delta WQCP and D-1641.

- **Vernalis Adaptive Management Plan (VAMP).** The Vernalis Adaptive Management Plan (VAMP) is a science-based, adaptive management plan designed to determine and protect the survival and transport of salmon smolts through the Delta in relation to the flow of the San Joaquin River, SWP/CVP exports, and the operation of a fish barrier located at the Head of Old River. This

study calls for a regulated pulse flow level at Vernalis and a predetermined SWP/CVP export rate for a 31-day period during April and May. Table 2-1 shows the allowable export rates as a function of the flow at Vernalis. The San Joaquin River Agreement (SJRA) stipulates the target flow rate of the San Joaquin River and includes an agreement that a group of water users would supply the flows during this period, based on the San Joaquin Valley Water Year Hydrologic Classification (index of water supply availability and wetness). VAMP was included in D-1641, a water rights decision that implemented the 1995 Delta WQCP. In the No Action/No Project Alternative, Reclamation would use CVPIA (b)(2) water to account for export reductions due to the limited pumping during April and May. CVPIA (b)(2) water has been used to account for decreased SWP exports in the past; the SWP would be unlikely to participate in VAMP in the No Action/No Project Alternative without a method to repay the SWP contractors for export losses.

Table 2-1
VAMP Export Limitations

Export Rates	***Vernalis Flow Rate (cfs)***			
(cfs)	***7,000***	***5,700***	***4,450***	***3,200***
1,500	X		X	X
2,250		X		
3,000	X			

- **1995 Delta Smelt Biological Opinion.** On March 6, 1995, USFWS issued a biological opinion on the effects of the long-term operation of the CVP and SWP on the Federally listed, threatened delta smelt and its critical habitat (USFWS 1995). The biological opinion concluded that CVP and SWP operations, as proposed,[6] are not likely to jeopardize the continued existence of the delta smelt or result in the destruction or adverse modification of proposed critical habitat for the delta smelt. To promote recovery of the species and to ensure that Project operations would not interfere with the survival and recovery of the species, USFWS issued a number of recommendations relating to (1) incidental take at various locations in the Delta; (2) fish salvage; (3) monitoring of Delta parameters such as X2 and outflow; and (4) conservation of the species. The CVP and SWP currently operate in accordance with the USFWS 1995 Delta Smelt Biological Opinion.

  The 1995 Delta Smelt Biological Opinion contains an export pump reduction (item 2 on page 19 of the opinion), commonly referred to as the "2 to 1 Vernalis flow/export ratio." This pump reduction objective calls for the SWP and CVP to reduce combined exports, below that allowed in the 1995 Delta WQCP, during a 31-day period in April and May. The 1995 Delta WQCP allows exports to be

[6] Operations "as proposed" included provisions from prior biological opinions, water quality standards, and the implementation of the Recovery Plan, which were expected to result in improved habitat.

100 percent of the base flow at Vernalis[7] during the April-May pulse period, when additional water is released to simulate historic snowmelt flows for fish. The 1995 Delta Smelt opinion reduces exports even further, so that exports can only be 50 percent of the base flow at Vernalis. CVPIA 3406(b)(2) water would be used to account for this decrease, and this water is part of the baseline fishery protection. Multiple interpretations of this requirement led to conflict between the SWP and USFWS, and the SWP would be unlikely to meet this requirement in the No Action/No Project Alternative without compensation for water supply loss.

- **2002 Spring-run Chinook and Steelhead Biological Opinion.**[8] On September 20, 2002, NOAA Fisheries issued a biological opinion on CVP and SWP Operations, April 1, 2002, through March 31, 2004, on Federally listed threatened Central Valley spring-run Chinook salmon and threatened Central Valley steelhead (NOAA Fisheries 2002). The Biological Opinion established non-discretionary terms and conditions that are intended to minimize the adverse effects of flow fluctuations associated with upstream reservoir operations on the incubating eggs, fry and juvenile steelhead, and spring-run Chinook salmon. These terms and conditions pertain to flow and water temperature requirements, ramping criteria, flow fluctuations, and incidental take/fish salvage of the species.

- **Full Use of 800 TAF Supply of Water Pursuant to Section 3406(b)(2) of the CVPIA**. At the August 2000 signing of the CALFED ROD, the decision by the Department of the Interior (Interior) regarding the use of (b)(2) water included "reset" and "offset,"[9] provisions that were further clarified in the CALFED ROD. The 2002 Federal District Court decision, however, determined that (b)(2) implementation should not include these reset and offset provisions (see Section 1.6.2). The District Court's ruling on offset and reset was upheld by the Ninth District Court. The No Action/No Project Alternative includes the dedication and management of the 800,000 acre-feet using a policy that reflects the opinion of the court.

- **Level 2[10] Refuge Water Supplies.** Section 3406(d) of the CVPIA authorizes and directs the Secretary of the Interior to provide firm water supplies of suitable quality to certain national wildlife refuges in the Central Valley of California, certain State of California wildlife management areas, and the Grassland Resource Conservation District (collectively referred to below as "refuges") in accordance with the 1989 *Report on Refuge Water Supply Investigations and the 1989 San Joaquin*

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7 Vernalis is a town on the San Joaquin River just downstream from the confluence with the Stanislaus River. The location is used as a measure of the San Joaquin River flow and water quality.

8 NOAA Fisheries issued this biological opinion after the signing of the CALFED ROD; however, it is included in the No Action/No Project because it also changes the operations of the Delta to benefit fish and the environment.

9 "Reset" and "offset" are defined on Page 56 of the CALFED ROD (CALFED, 2000b).

10 The Reclamation Report on Refuge Water Supply Investigations (March 1989) defined four levels of refuge water supplies: existing firm water supply (Level 1), current average annual water deliveries (Level 2), full use of existing development (Level 3), and permission for full habitat development (Level 4). CVPIA Section 3406(d) committed to providing firm water through long-term contractual agreements for Level 2 refuges.

Basin Action Plan/Kesterson Mitigation Plan (USFWS and Reclamation 2002). Level 2 supplies are defined in the Investigations Report as the historic annual average water deliveries to each refuge prior to enactment of the CVPIA and two-thirds of the water supplies identified for the Action Plan Lands (USFWS and Reclamation 2002). These firm water supplies must be provided at the refuge boundaries, as required by the CVPIA. To the extent available, the CVP will use its share of the benefits from Joint Point of Diversion (as explained in Section 2.3.2.1.1) to comply with its Level 2 refuge water supply mandates, but using such benefits will not create any limitation on the overall Level 2 supply that is available for refuges.

To implement these fish protection requirements, fishery and Project agencies could take several actions described in the sections below.

2.3.1.1.1 Reducing Delta Pumping

Pumping water through the Tracy and Banks pumping plants (see Figure 2-1) alters Delta hydrodynamics, changing conditions for rearing and migrating fish. Fish mortality at the pumps may result directly from entrainment[11] through fish screens, impingement,[12] predation, and handling of captured fish in the salvage process. The operation of the pumping plants may also have indirect effects on fish. Altered net flow patterns may change migratory patterns and increase the likelihood of predation. Pumping reductions may help reduce these effects on Delta hydrodynamics and reduce entrainment of fish at the pumping facilities.

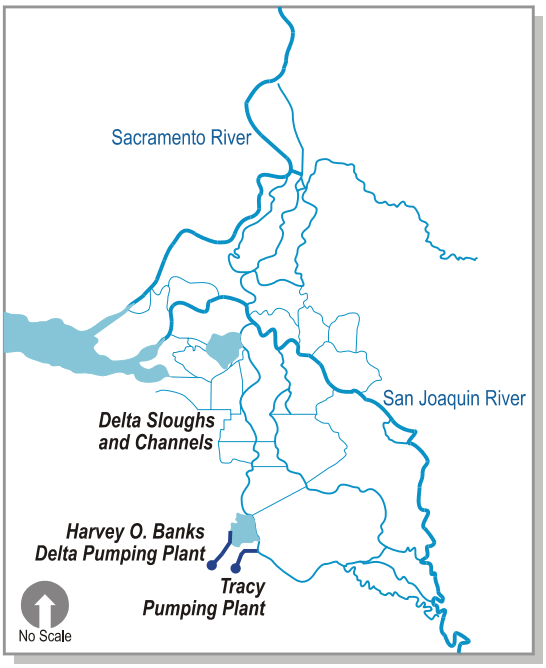

Figure 2-1
Location of Delta Export Pumps

In the No Action/No Project Alternative, Project Agencies would implement pumping reductions when the fish protection requirements mandated the reduction. The biological opinions would result in pump reductions when fish take at the pumps reached the "reconsultation level" established in the relevant opinion.[13] Table 2-2 shows the times that these protections would be likely to require pump reductions and the reasons that reductions would help fish.

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11 "Entrainment" occurs when fish are drawn into the pumps, which can injure fish or place them into unsuitable habitat. (Reclamation 2003.)

12 "Impingement" occurs when fish are trapped against the outer surface of a fish screen. (Environmental Protection Agency 2001.)

13 The biological opinions establish levels that define responses to fish mortality: "warning level" indicates that caution should be used, "reconsultation level" indicates that the action leading to fish mortality triggers reinitiating consultation, and "jeopardy" indicates that the action could place the continued existence of the fish species in jeopardy.

Table 2-2
Pump Reductions in the No Action/No Project Alternative

Timeframe	Benefiting Fish[14]	Reason	Regulatory Mechanism
December – January	Juvenile salmonids	Protect outmigrating juvenile salmonids	Biological opinion
	Adult smelt	Protect upmigrating adult smelt	Biological opinion
February – March	Juvenile salmonids	Protect outmigrating juvenile salmonids	Biological opinion
	Adult smelt	Protect upmigrating adult smelt	Biological opinion
April – May 31 days	Salmon smolts	Determine how export pumping affects survival and passage of salmon smolts through the Delta	D-1641 (VAMP) (SWP may not follow if not reimbursed)
June	Juvenile smelt	Protect juvenile smelt near the pumps	Biological opinion

In the No Action/No Project Alternative, the Projects would attempt to recover the water from reduced pumping through a variety of actions. The CVP would use (b)(2) water to account for the pumping reductions up to the 800,000 acre-foot upper limit. Both the SWP and CVP would use operational flexibility, as discussed in Section 2.3.2.1, to recover additional water. These sources are not likely to be sufficient to compensate for all pump reductions.

2.3.1.1.2 Closing the Delta Cross Channel Gates

The Delta Cross Channel (DCC), near the town of Walnut Grove, diverts Sacramento River water eastward to the Mokelumne River system where it more directly affects flows across the central Delta to the Project pumps (Figure 2-2). Net movement of water in a southerly direction through the Delta is not a natural hydrological process and can confuse migrating salmon that are attempting to follow streamflows.

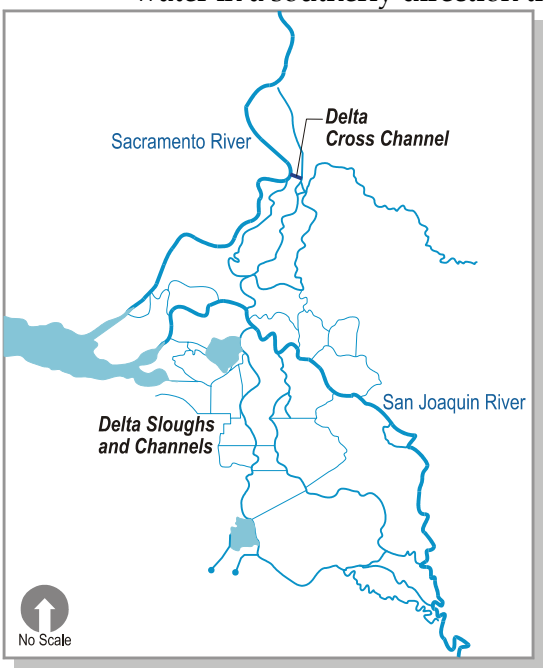

Figure 2-2
Location of Delta Cross Channel

Avoiding this effect is particularly important during the winter, when the winter-run Chinook salmon, a Federal- and State-listed endangered species, is migrating upstream to spawn. (The fall/late fall-runs are also migrating at this time, but they are classified as candidate – rather than endangered - species.) DCC gate closure during the winter also helps reduce the chance that emigrating spring-run and winter-run Chinook salmon and steelhead smolts might travel through the central Delta and swim toward the pumps instead of taking their natural route to the Bay.

Closing the DCC gates ensures that juvenile spring-run and winter-run Chinook salmon and steelhead smolts remain in the mainstem Sacramento River, improving their likelihood of successful outmigration through the western Delta and San

[14] "Benefiting Fish" only include the fish that require pumping reductions through a regulatory mechanism. Incidental benefits to other fish would also result from some reductions.

Francisco Bay. The closure, however, also reduces the contribution of the Sacramento River to the central Delta, which may aggravate salinity intrusion. With the DCC closed, for the same exports, more flow comes from the western Delta, which is closer to the bay and has lower water quality. The Project Agencies may reduce export pumping in response to the changes in flow direction.

The regulatory baseline dictates DCC gate closures as follows:

1) Reclamation standing operating procedures call for gate closure when flow on the Sacramento River reaches 20,000 to 25,000 cfs.

2) State Water Resources Control Board Decision 1641 allows for the following operations of the DCC gates:

   – From November 1 through January 31 the gates will be closed for up to 45 days as requested by USFWS, NOAA Fisheries, and CDFG. These closures are determined as follows:

     • If the Knight's Landing catch index (KLCI) is > 5 and ≤ 10 salmon, the DCC gates will be closed for 4 days within 24 hours. If after 4 days the KLCI still exceeds 5, the gates will remain closed for another 4 days.

     • If the KLCI is > 10 salmon, the DCC gates are to be closed until the KLCI is ≤ 5.

   – The gates will be closed continuously from February 1 through May 20.

   – From May 21 through June 15 the gates will be closed for a total of 14 days, again as requested by USFWS, NOAA Fisheries, and CDFG.

2.3.1.1.3 Increasing Instream Flows

Increasing flows year-round in upstream river reaches would improve habitat conditions for anadromous and resident fish populations. Reclamation and USFWS may use CVPIA (b)(2) supplies to meet these objectives; therefore, the water would be used to increase flows on CVP-controlled streams, such as the Sacramento, American, and Stanislaus Rivers and Clear Creek. The improved flows would:

- Provide improved spawning and rearing habitat for salmon and steelhead;
- Improve survival of downstream migrating Chinook salmon smolts;
- Improve habitat conditions for white sturgeon, green sturgeon, American shad, and striped bass to migrate upstream, spawn, and allow progeny to survive;
- Aid in the downstream transport of striped bass eggs and larvae;
- Improve water temperatures and increase habitat for rearing juvenile steelhead; and

- Benefit delta smelt and other estuarine species.

The rationale and scientific basis for the improved flows are found in a variety of sources (including the Anadromous Fish Restoration Program[15] documents, published literature, CDFG reports, and other restoration programs) and are generally based on results of instream flow and temperature studies conducted by the USFWS, CDFG, or others, as well as relationships between flow and adult returns, correlation analyses, and other life-history information.

The flow objectives for each stream would be generally consistent with the Anadromous Fish Restoration Program's January 2001 Final Restoration Plan (AFRP Plan). These flow objectives would be higher than current existing minimum flow requirements in each stream. The targeted flow objectives would be based on thresholds of CVP reservoir storage and forecasted inflow and the amount of (b)(2) water available to meet the objectives. Fisheries and hydrologic monitoring would trigger higher flow releases. In general, spawning flows would be initiated in October or November when adult salmon are observed in the streams and river temperatures are 60 degrees or less.

2.3.1.1.4 Augmenting Delta Outflows

Water from the Delta flows to the San Francisco Bay, which is more saline than the Delta estuary. The water mixes in the Suisun Bay area, and the mixing zone location varies depending on the Delta outflow. Higher amounts of Delta outflow push the saltwater mixing zone farther out to the Bay, and lower flows allow the saltwater zone to move farther into the Delta. The No Action/No Project Alternative would include actions related to Delta outflow required by the SWRCB's Decision 1641.

2.3.1.2 Non-Flow-Related Actions

In the future under the No Action/No Project Alternative, a number of ongoing projects and programs are expected to continue, the purpose of which is to improve the condition of species and habitats. Under the CVPIA, funding in 2002 was dedicated to projects that will be designed and implemented during the EWA timeframe. Under the CALFED ERP, funding in 2002 was dedicated to projects that will be designed and implemented during the EWA timeframe. These activities are considered a part of the No Action/No Project Alternative because their purpose is for fish protection and environmental protection and because they may create beneficial and/or adverse effects during the EWA timeframe on similar resources, in the absence of the EWA.

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[15] The U.S. Department of the Interior established the Anadromous Fish Restoration Program to satisfy Section 3406 (b)(1) of the CVPIA: "develop within three years of enactment and implement a program which makes all reasonable efforts to ensure that, by the year 2002, natural production of anadromous fish in Central Valley rivers and streams will be sustainable, on a long-term basis, at levels not less than twice the average levels attained during the period of 1967-1991..."

2.3.2 Water Management

In the No Action/No Project Alternative, it could be reasonably predicted that, in the foreseeable future, pumping reductions for biological opinions would result in reduced CVP and SWP exports. The CVP and SWP could use operational flexibility within the Delta to try to make up for the water lost during pump reductions. If the Projects could not access enough water, they would then reduce their deliveries to water users. The water users would likely then implement actions to reduce or address their shortages. These two groups of water management actions are described below.

2.3.2.1 Delta Operational Flexibility

In the No Action/No Project Alternative, the Projects would be able to access water from flexibly operating the Delta export facilities. These types of flexible operations were defined prior to the EWA and would be available for the Projects to help repay their users for pump reductions (see Section 2.3.1.1.1). Only the third item, relaxing the export/inflow ratio, would provide additional water for the project. The other two options would provide additional capacity for the Projects to move water through the Delta, but they would not provide additional water to reimburse water users for lost water. In the No Action/No Project Alternative, these actions would be unlikely to provide enough water or capacity to replace the water lost during fish actions. The sections below describe the available options to increase water and capacity.

2.3.2.1.1 Joint Point of Diversion

The Joint Point of Diversion, established by D-1641,[16] allows the SWP and CVP to pump water for each other during times of restriction for one set of pumps. D-1641 established a staged implementation, in which the Projects would gradually begin to use facilities jointly.

- **Stage 1:** the CVP can use Banks Pumping Plant to divert water for selected CVP contractors, and either Project could use the others' facilities to recover export reductions to protect fish if the Projects complete a Water Level Response Plan that outlines the responses to changing water levels in the south Delta.

- **Stage 2:** the Projects can divert water from either pumping plant for any of their permitted purposes up to permitted capacity. The Projects must submit an operations plan to protect fish and wildlife and other legal users of water.

- **Stage 3:** the Projects can divert water from either pumping plant up to the physical plant capacity if they completed an operations plan to protect aquatic resources and their habitat and protect other legal users of water and if they implement water barriers or other water level protection.

The stages of Joint Point of Diversion are discussed in more detail in Section 4.1.3.2.

[16] Water rights Decision 1641 is explained in more detail in Chapter 1.

Prior to the CALFED ROD, the Projects were in Stage 1 and Stage 2 of the implementation process and could use Joint Point of Diversion to replace water that had been lost during pump reductions to protect fish. It is reasonably foreseeable that without the CALFED ROD, the Project Agencies would have completed the requirements to move into Stage 3 in which they could use the Joint Point of Diversion to supply water to their contractors in the Export Service Area.

In the No Action/No Project Alternative, the Joint Point of Diversion could provide additional capacity to pump water into the Export Service Area, but the Projects would need to provide the water to be pumped.

2.3.2.1.2 Relaxation of the Section 10 Constraint

The SWP is limited under Section 10 of the Rivers and Harbors Act,[17] pursuant to U.S. Army Corps of Engineers (USACE) Public Notice 5820-A, to a 3-day average rate of diversion of water into Clifton Court Forebay of 13,250 acre-feet per day, or 6,680 cfs. Between December 15 and March 15, the SWP can increase diversions above 6,680 cfs by one-third of the San Joaquin River flow at Vernalis when this flow is greater than 1,000 cfs.

The USACE granted permission to the SWP to relax the Section 10 constraint and increase the base diversion rate by the equivalent of 500 cfs to an average of 7,180 cfs for the months of July through September. The relaxation was initially permitted for summer 2000–02. Another application for relaxation in 2003 and 2004 has been submitted and is expected to be approved in 2003. In the No Action/No Project Alternative, this 500 cfs, if renewed, would be used to replace water lost during pump reductions to benefit fish. The conveyance capacity would yield approximately 50,000 to 60,000 acre-feet per year, depending on operational restrictions.

2.3.2.1.3 Relaxation of the Export/Inflow Ratio

Under the SWRCB's D-1641 and Orders 2000-10 and 2001-5, Project exports are limited to a percentage of Delta inflow, usually 35 or 65 percent. This limitation is commonly called the Export/Inflow, or E/I, ratio, and the values throughout the year are shown in Table 2-3. D-1641 allows for these ratios to be relaxed at the discretion of the NOAA Fisheries, USFWS, and CDFG. In the No Action/No Project Alternative, water that is diverted because of the E/I ratio relaxation would be used to reimburse the Projects for water lost during pump reductions to protect fish.

2.3.2.2 Water Users' Actions

If EWA were not implemented and export users received reduced deliveries due to pumping reductions described in Section 2.3.1.1.1, the export users could engage in one or more of the following options:

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[17] Section 10 of the Rivers and Harbors Act prohibits the obstruction or alteration of navigable waters of the U.S. without a permit from the USACE. Under Section 10, the USACE regulates projects or construction of structures that could interfere with navigation. A Department of the Army permit is needed to construct any structure on any navigable water of the United States, to excavate or deposit material in such waters, or to do any work affecting the course, location, condition, or physical capacity of such waters.

Table 2-3 ***Export/Inflow Ratio***	
Period	***Percent of Total Delta Inflow***
October – January	65
February	35 – 45
March – June	35
July – September	65

- Accept the shortage;
- Increase local water supplies by one or more of the following methods:
  - Groundwater pumping,
  - Local transfers,
  - Recycling,
  - Desalination, or
  - Water use efficiency or conservation;
- Idle or retire agricultural lands;
- Groundwater substitution and crop idling transfers in northern California.
- Pursue independent water transfers (similar to EWA-type transfers); or
- Turn to litigation and/or political pressure to revise the ESA. Although litigation and political pressure may occur in the foreseeable future, subsequent responses to these actions would likely be beyond the timeframe of this EIS/EIR (2002-07).

No other resolution of conflicts at the Delta export pumps can be reasonably predicted for the foreseeable future.

2.4 Flexible Purchase Alternative (The Proposed Action/The Proposed Project)

All action alternatives would need to address the EWA Operating Principles Agreement in relation to acquiring water to compensate for pump reductions and for taking beneficial fish actions as outlined in the CALFED ROD. The Flexible Purchase alternative would allow the EWA agencies the ability to acquire up to 600,000 acre-feet of water assets to address pump reductions, fish actions, and to compensate the CVP/SWP for water otherwise lost due to those actions. Any alternative has to be able to allow the EWA agencies to use water for a broader range of fish actions than envisioned in the CALFED ROD. These actions would include reducing Delta export pumping, closing the Delta cross channel, augmenting Delta outflow, or increasing instream flows. The EWA agencies would have the flexibility to choose from these

actions to best protect at-risk fish, and would not need to solely focus on actions within the Delta. The Flexible Purchase Alternative would allow the EWA agencies to respond to changes in base condition operations, such as modifications to (b)(2), while providing higher levels of fish actions than either of the other alternatives. Any alternative would be limited primarily by funding in that the EWA agencies would determine the amount of assets to acquire largely based on available funding and asset prices. Any alternative would have flexibility to respond to changing fish and hydrologic conditions midway through a year.

The Flexible Purchase Alternative would allow the EWA agencies to vary water purchases from those defined in the CALFED ROD to meet needs in a specific year. The CALFED ROD identified a minimum of 185,000 acre-feet of water purchases per year, with at least 35,000 acre-feet coming from areas that are upstream from the Delta and 150,000 acre-feet from the export service areas. The Flexible Purchase Alternative would allow the EWA Project Agencies to purchase up to 600,000 acre-feet of water, although the EWA agencies would typically acquire 200,000 to 300,000 acre-feet annually, except in wet years or years with high fish needs (see Section 2.4.3 for a discussion of a typical year). Water purchases in this alternative would be neither fixed at 185,000 acre-feet per year nor held to specific purchase quantities upstream from the Delta or in the export service areas. The EWA agencies would use the concept of functional equivalence (as defined in Section 2.2.2.3) to combine methods, water sources, and operational flexibilities in this alternative to provide a broad range of fish actions, to help offset changes in levels of protection provided by (b)(2) assets, or to increase the EWA in the future. Variable assets would be acquired at the same rate as in the other action alternative.

This Alternative would allow the EWA Project Agencies to acquire up to 200,000 acre-feet of storage capabilities if a reasonably priced option were available; this EIS/EIR assesses the environmental effects of groundwater storage because it is the most likely storage option. If groundwater storage could not be implemented for financial or technical reasons, the alternative would allow other actions to achieve similar objectives.

If the EWA assets were fully used but were not sufficient to prevent jeopardy, then the EWA Management Agencies would initiate Tier 3. (See Section 2.1.3) In the Flexible Purchase Alternative, the EWA Management Agencies would not likely need to initiate Tier 3 frequently because the Flexible Purchase Alternative includes high upper limits for purchases. If Tier 3 were needed, additional acquisitions would be covered by this environmental document as long as the total assets (Tier 2 and Tier 3) were less than 600,000 acre-feet. Asset purchases above 600,000 acre-feet would require additional environmental analysis. The Flexible Purchase Alternative would cost more, have greater benefits for fish (supporting protection and recovery), and would likely result in a reduced frequency of initiating Tier 3 relative to the other alternatives.

Providing flexibility to operate differently each year could help the EWA agencies address varying needs for water in different year types. Fish actions at the export

pumps are dependent on the presence of the fish near the pumps, a factor that is not always dependent on the hydrologic year type. After the EWA agencies undertake a fish action, the program must repay water to the affected CVP or SWP water users. As explained previously, the EWA agencies owe those projects the amount of water that could have been pumped during the time of a pump reduction. During a typical dry year the pumps are not very active because there is less exportable water in the Delta. The Projects do not pump as much water in dry years because supplies are limited. Therefore, the level of compensation required to the Projects would be less than in below normal to wet years. In wet years, the amounts of water in the Delta allow the Project Agencies to operate the export pumps at their maximum permitted capacity. The water that would have been pumped in a wet year is much greater than in a dry year. In wet years, the EWA agencies must be able to provide more water to repay the projects than in dry years.

The next two sections (2.4.1 and 2.4.2) describe the components of the Flexible Purchase Alternative, including the EWA agencies' actions to protect fish and benefit the environment, and the actions to acquire and manage assets. Section 2.4.3 includes a description of the "typical" year EWA operations. Section 2.4.4 describes the EWA agencies' acquisition strategy.

2.4.1 Actions to Protect Fish and Benefit the Environment

The EWA agencies have established operating tools that allow them to protect fish. These operational tools include (1) reducing export pumping, (2) closing the Delta Cross Channel gates, (3) increasing instream flows, and (4) augmenting Delta outflow. These actions were described in the No Action/No Project Alternative, Section 2.3.1.1. These actions take place throughout the year, under various conditions. The EWA agencies use their acquired assets, in addition to actions specified in the regulatory baseline fishery protection, to meet protection objectives for at-risk fish species within the Sacramento and San Joaquin Rivers and their tributaries and the Delta. Each tool, its timing, the protection it provides, and why and how each action is undertaken is described below. These descriptions are followed by an explanation of the process used to decide when actions should be taken.

2.4.1.1 Export Pumping Reductions

As described for the No Action/No Project Alternative, reducing export pumping can protect fish in the vicinity of the export pumps and also can provide secondary benefits to fish throughout the Delta. The Management Agencies typically use pump reductions from December to June, but vary them each year depending on the behavior of the fish and hydrologic conditions and water quality. The general times of year for pump reductions that benefit specific fish types would be similar to the No Action/No Project Alternative. The EWA agencies would not necessarily wait to reach "reconsultation level" conditions identified in the Biological Opinions before calling for export reductions. In the Flexible Purchase Alternative, the EWA agencies could use the assets to take fish actions when they deem most appropriate (likely sooner than in the No Action/No Project).

Actual EWA pump reductions would vary each year depending on fish conditions, hydrology, available EWA assets, and other factors. The potential reductions are discussed below by time of year.

2.4.1.1.1 Export Reductions in December and January

Reducing exports in December and January during critical outmigration periods would increase survival of outmigrating salmonids from the Sacramento basin, including listed winter-run Chinook, spring-run Chinook, steelhead trout, and candidate late-fall and fall-run Chinook. Adult delta smelt and Sacramento splittail are also migrating upstream to spawning areas at this time.

This reduction would increase the survival of juvenile Chinook salmon smolts (including winter-run presmolts and spring-run yearlings) migrating through the Delta in the winter. It is scientifically supported by several years (1993 – 2002) of mark/capture data that indicate the survival of juvenile late fall-run Chinook salmon in the central Delta decreases as exports increase. Further support for a pump reduction is based on a recent analysis that indicates that December is an important migration period for winter run pre-smolts and that the Delta Cross Channel gate closures during December appear to be correlated with low winter-run salvage at the export facilities later in the year.

Typical actions would reduce combined pumping at Banks and Tracy Pumping Plants to 6,000 cfs for 5 days at a time, and in some years those reductions occur several times during these months. For example, the EWA in past years reduced pumping for 10 days total in January and used 65,000 to 70,000 acre-feet of assets. During these months, the EWA agencies usually reduce pumping in conjunction with closing the Delta Cross Channel gates.

2.4.1.1.2 Export Reductions in February and March

Reducing pumping in the critical out-migration period in February and March would increase survival of out-migrating juvenile Chinook salmonids from the Sacramento basin, with a focus on ESA listed winter-run Chinook salmon and steelhead trout. Adult delta smelt and Sacramento splittail also are migrating upstream to spawning areas at this time.

This reduction would increase the survival of juvenile salmonid smolts migrating through the Delta in the late winter. Several years (1993 – 2002) of mark/recapture data indicate that the survival of juvenile late fall-run Chinook salmon in the central Delta decreases as exports increase. These export reductions would supplement the primary protective action of closing the Delta Cross Channel gates during this period. Reduced exports also decrease ESA incidental take of juvenile winter-run salmon, spawning adult delta smelt and Sacramento splittail when the species are in the south/central Delta. Typical actions would reduce pumping to 6,000 cfs –8,000 cfs for 5-10 days at a time in February through March.

2.4.1.1.3 Export Reductions in April and May

Reducing Delta exports during April and May would help out-migrating juvenile fall-run Chinook salmon. As described in the No Action/No Project Alternative, the VAMP program calls for specific flow releases from the Stanislaus, Tuolumne, and Merced Rivers and specific pump reductions during 31 days, generally from mid-April to mid-May. These actions would evaluate the relative effects of export and inflow to juvenile San Joaquin basin Chinook salmon survival and assist in providing protection for both anadromous and estuarine species. The CVP would use (b)(2) water to undertake the VAMP study in the No Action/No Project Alternative, but the SWP may not have water to contribute to the study. As part of the Flexible Purchase Alternative, the EWA could provide water for the SWP to participate in VAMP.

The Flexible Purchase Alternative could also include pumping reductions before April 15 to protect juvenile anadromous or resident species (including delta smelt). After May 15, the EWA agencies could request that exports continue at some reduced stable level or allow exports to ramp up gradually between May 16 and June 1. These additional days of reduced exports would provide additional protection for juvenile anadromous and resident estuarine species.

2.4.1.1.4 Export Reductions in June and July

Delta pumping reductions in June could decrease losses of juvenile delta smelt and splittail. Also, a gradual increase (ramp up) rather than a rapid increase of exports during June may be used to increase survival of both anadromous and resident estuarine species in the south/central Delta. In some years, these actions may continue into the early part of July.

Pumping reductions would decrease the effects of CVP/SWP export facilities on listed resident fish in the south Delta and would enable juvenile resident estuarine and anadromous species to migrate away from the export facilities where they are less vulnerable to direct loss and/or direct mortalities associated with export operations. Data indicate "incidental take" is greater when fish population densities are high near the export facilities or when exports increase. Additional information indicates that, generally, when the export rate increases rapidly under low Delta inflow and fish densities are high in the south/central Delta, fish losses at the facilities can be high.

2.4.1.2 Closing the Delta Cross Channel Gates

As discussed for the No Action/No Project Alternative, closing the DCC gates increases the likelihood that juvenile spring-run and winter-run Chinook salmon and steelhead smolts remain in the mainstem Sacramento River, improving their survival and likelihood of successful out-migration through the western Delta and San Francisco Bay.

When DCC gates are closed outside the regulatory baseline, EWA must compensate for water supply losses from these reductions. Additional gate closures would typically occur in November, December, January, May, or June, if additional closures were needed after the regulatory requirements of the No Action/No Project were met.

2.4.1.3 Increasing Instream Flows

Increasing instream flows would improve habitat conditions in tributary rivers and the Delta for anadromous and resident fish. The Flexible Purchase Alternative would include flow increases beyond those in the No Action/No Project Alternative. Table 2-4 shows fish species that could require supplemental flows in various rivers and tributaries to meet habitat requirements for the various life history stages. The table also displays the timing of each life history stage and the rivers (those affected by EWA actions) in which each fish species can be found.

Table 2-4
Anadromous Fish Life History Stages and Locations

Fish	*Run*	*Stage*	*Month*	*Location*
Chinook Salmon	Fall	Immigrating adult	July - December	Sacramento, Feather, Yuba, American, San Joaquin, Merced
		Spawning	October - December	
		Emigrating juvenile	January - June	
	Late-fall	Immigrating adult	October - April	Sacramento, Feather, Yuba
		Spawning	December - April	
		Emigrating juvenile	May - December	
	Winter	Immigrating adult	December - July	Sacramento
		Spawning	Late April - mid-August	
		Emigrating juvenile	August - March	
	Spring	Immigrating adult	March - September	Sacramento, Feather, Yuba
		Spawning	Mid-August - October	
		Emigrating juvenile	November - June	
Steelhead	Central Valley	Immigrating adult	August - March	Sacramento, Feather, Yuba, American, San Joaquin, Merced
		Spawning	December - April	
		Emigrating juvenile	January - October	
American shad		Immigrating adult	April - May	Sacramento, Feather, Yuba, American, San Joaquin
		Spawning	June - July	
		Emigrating juvenile	August - October	
Green Sturgeon		Immigrating adult	February - June	Sacramento
		Spawning	March - July	
		Emigrating juvenile	June - August	
White Sturgeon		Immigrating adult	February - May	Sacramento, American, San Joaquin
		Spawning	May - June	
		Emigrating juvenile		

Source: Final Restoration Plan for the Anadromous Fish Restoration Program (AFRP Plan) (USFWS 2003)

Supplemental flows, over the existing baseline for fishery protection requirements for instream flows, provide additional water primarily to benefit salmon and steelhead adult immigration, spawning, egg incubation, rearing, and emigration of juveniles through the regulation of pulse flows, water temperature, water quality, and the maintenance of attraction and flushing flows. While not the primary objectives of the EWA, instream flows may also aid white and green sturgeon emigration, spawning, egg incubation, and rearing and American shad spawning, incubation, and rearing.

The EWA instream flow actions would occur on the waterways where the EWA purchases assets, including the Sacramento, Feather, Yuba, American, Merced, and San Joaquin Rivers. The EWA actions to increase instream flows would use the AFRP as a guide to identify the times and locations that supplemental flows are needed. CALFED's Environmental Water Program (EWP) and the CVPIA (b)(2) water would also help to meet the above objectives. CVPIA (b)(2) water can currently be used to augment instream flows, and the EWP may be able to take these actions in the future. The EWP is described further in Chapter 22, Cumulative Analysis Framework.

2.4.1.4 Augmenting Delta Outflows

Fresh water from the Delta flows to the San Francisco Bay, which is more saline than the Delta estuary. The fresh water mixes with salt water in the Suisun Bay area, and the mixing zone location varies depending on the Delta outflow. Higher amounts of Delta outflow push the saltwater mixing zone farther out to the bay, and lower flows allow the saltwater zone to move farther into the Delta. Augmenting Delta outflows could move the saltwater mixing zone farther into the bay, improving the water quality within the Delta. The Flexible Purchase Alternative could include actions to augment Delta outflow in addition to outflows required by the SWRCB's Decision 1641 and existing baseline level of fishery protection. Augmenting Delta outflow would also help to restore a westward-moving flow pattern through the Delta, which would help outmigrating fish.

In addition to taking direct actions to augment Delta outflows, other actions within the Flexible Purchase Alternative would have the secondary benefit of increasing Delta outflows. When the EWA agencies reduce Delta export pumping, the water that would have been pumped instead becomes Delta outflow. Delta outflow would also increase during the summer months when EWA assets are moved through the Delta because the transfers must include outflow water (carriage water) to maintain water quality (see Section 2.4.2.1 for additional information).

2.4.1.5 Decision-Making Process

A multi-agency team called the EWA Team (EWAT) decides when fish actions should be taken, using a consensus process based upon biological indicators for the species considered to be at immediate risk. This decision is not solely based on the take limits at the export pumps. Appendix D includes the existing decision trees for delta smelt and Chinook salmon.

EWAT considers the technical input of the Data Assessment Team (DAT), which includes stakeholder representatives, when deciding when fish actions should be taken. When the EWAT cannot reach consensus or decides issues should be elevated, issues are presented to the Water Operations Management Team (WOMT) for resolution. Decisions are reported to the CALFED Operations Group, including agency and stakeholder representatives.

The EWA agencies in November and December begin the process of identifying placeholders[18] for the next year in coordination with the (b)(2) interagency team. These placeholders are determined based upon biological objectives and hydrology (which includes the latest forecast/allocation study for both the CVP and SWP). These placeholders are then evaluated monthly to determine whether they are still applicable for the current month or for the following months (up until June). The use of the EWA placeholders in a particular month is based upon the biological decision trees for salmon and delta smelt and real-time monitoring. The placeholders, if not used in a particular month, can be reassigned and used in another month. The purposes in identifying these placeholders are to assist the Project Agencies in acquiring contracts for water purchases and to inform the EWA agencies of upcoming EWA actions.

Figure 2-3
Asset Acquisition and Management Areas

2.4.2 Asset Acquisition and Management

This section is organized according to the geographic areas in which the EWA Project Agencies acquire and/or manage assets for the Flexible Purchase Alternative: upstream from the Delta (Section 2.4.2.1), the Delta (Section 2.4.2.2), and the export service areas (Section 2.4.2.3). Figure 2-3 shows each of these areas.

The EWA Project Agencies can use any of the acquisition methods described below to purchase water. Flexibility to purchase from any of these sources is critical to helping the EWA run efficiently because it allows the Project Agencies to purchase the least expensive water available in any given year. Table 2-5 lists agencies that may be willing to sell water to the EWA or have sold water to the EWA in past years,[19] along with a general range of potentially available water volumes. None of the purchases in Table 2-5 are guaranteed; the EWA Project Agencies could only make purchases if a seller is willing to participate.

The numbers presented in Table 2-5 are estimates and do not necessarily reflect the amount of water that would be available in any given year. Generally, these estimates

[18] Placeholders are an estimate of reductions necessary to protect fish.
[19] Information on past EWA transactions can be found online at http://wwwoco.water.ca.gov/calfedops/2001ops.html or http://wwwoco.water.ca.gov/calfedops/2002ops.html

reflect the potential upper limit of available water in order to include the maximum extent of potential transfers in the environmental analysis. Some of the agencies listed

Table 2-5
Potential Asset Acquisition and Management for the Flexible Purchase Alternative (Upper Limits)

	Range of Possible Acquisitions (TAF)				*Management*	
Water Agency	***Stored Reservoir Water***	***Groundwater Substitution***	***Crop Idling/ Subst.***	***Stored Groundwater Purchase***	***Ground-water Storage Services***	***Source Shifting/ Pre-Delivery***
Upstream from the Delta Region						
Sacramento River Area of Analysis						
Glenn-Colusa ID		20-60	100			
Reclamation District 108		5	45			
Anderson Cottonwood ID		10-40				
Natomas Central MWC		15				
Feather River Area of Analysis						
Oroville Wyandotte ID	10-15					
Western Canal WD		10-35	70			
Joint Water Districts		20-60	65			
Garden Highway MWC		15				
Yuba River Area of Analysis						
Yuba County WA	100	85				
American River Area of Analysis						
Placer County WA	20		10			
Sacramento GW Authority				10		
Merced/San Joaquin River Area of Analysis						
Merced Irrigation District		10-25				
Export Service Area						
San Joaquin Valley						
Kern County WA			115	50-165	X	X
Semi-Tropic WSD[1]					X	
Arvin-Edison WSD[1]					X	
Westlands WD			195			
Tulare Lake Basin WSD			110			
Santa Clara Valley						
Santa Clara Valley WD						X
Southern California						
Metropolitan WD						X

Abbreviations:
GW: Groundwater
ID: Irrigation District
MWC: Mutual Water Company
WA: Water Agency
WD: Water District
WSD: Water Storage District
Footnote 1: Semi-Tropic WSD and Arvin-Edison WSD are within Kern County Water Agency. Their groundwater storage facilities are separate from the Agency, but they may participate in other programs that the agency helps administer, such as crop idling.

in Table 2-5 indicated an interest in transferring water to the EWA, but could not provide a range of potentially available water supplies. The numbers in the table include estimates provided either by water sellers or the Project Agencies. Actual purchases would depend on the year type, EWA funding, and the amounts that sellers would be willing to transfer in a given year.

The EWA agencies would only purchase water from a willing seller.

The potential acquisitions in Table 2-5 would not all occur within a single year. The table is simply a menu that illustrates the flexibility the EWA Project Agencies have in making purchases. These EWA Project Agencies may negotiate one-year or multi-year

purchases when acquiring assets. Figure 2-4 shows the locations of the water agencies listed in Table 2-5.

Table 2-5 does not contain an exhaustive list of potential EWA sellers; additional agencies may decide at any time that they wish to sell water to the EWA. An analysis of the potential environmental effects of transferring water, however, requires information on the transfer sources. This environmental document will analyze the effects associated with the potential transfers in Table 2-5 and will serve as a document from which to tier, should other EWA transfers require a supplemental document. EWA water transfers that meet and implement the environmental measures incorporated into the project and mitigation measures developed in this document for the specific areas identified should not need additional environmental documentation once the programs have been reviewed and are complying with these measures.

Some sections of this document consider additional groundwater substitution or idling transfers in the analyses to assist potential future EWA transfers. The modeling includes increased transfers upstream from the Delta to provide analysis for potential additional future EWA transfers. This increase will prevent the EWA agencies from needing additional modeling if new transfers are suggested in the future. The analysis, therefore, considers increased asset acquisitions from waterways upstream from the Delta to assess the effects of transferring the amounts of water listed in Table 2-5 as well as potential new EWA transfers.

2.4.2.1 Upstream from the Delta Region

As shown on Figure 2-3, the Sacramento and San Joaquin Rivers flow into the Delta; therefore, these rivers and their tributaries are designated in this document as the Upstream from the Delta Region. Potential asset acquisitions in the Upstream from the Delta Region include stored reservoir water, groundwater substitution, crop idling/substitution, and stored groundwater purchase. (See sections 2.4.2.1.1 – 2.4.2.1.4.) The EWA agencies could use assets acquired in this region for multiple purposes, but would generally use assets to protect and restore fish species that are affected by the conflicts at the Delta export pumps, the primary objective of the EWA. The EWA protects fish at the pumps by reducing pumping when it would help at-risk fish species, then transferring EWA assets across the Delta at other times to repay CVP and SWP users for water lost during pump reductions.

Both the CVP and SWP have pumping plants in the southern portion of Delta - the Tracy Pumping Plant and the Harvey O. Banks Delta Pumping Plant, respectively. The Project Agencies use these facilities to pump water to users south of the Delta. The Project Agencies also use these pumps when available to move EWA water to the export service areas. Cross-Delta transfer capacity is generally available to the EWA when the Delta is in balanced conditions (as defined in Section 1.6.3), the SWP pumps are operating below their maximum permitted capacity to deliver water to contractors, and there is no reduction for fish purposes. Typically, the CVP pumps are

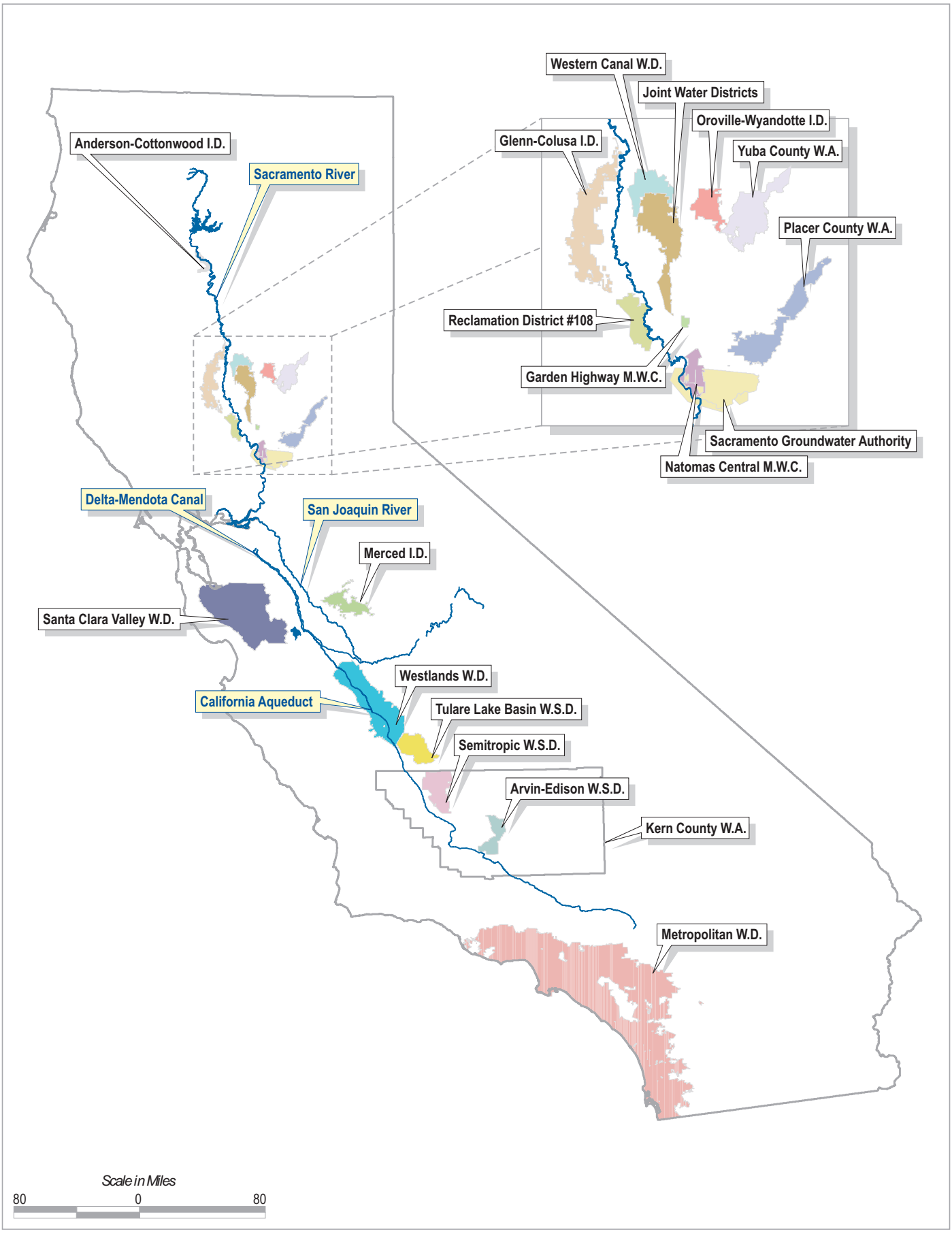

Figure 2-4
Potential Asset Acquisition and Management Participants

operating at full capacity for most of the year (except in dry years), so the EWA primarily uses the SWP pumps.

Delta pump availability varies by year type. The pumps are active during the wet season when the winter rains and spring snowmelt provide high flows into the Delta. New Bay-Delta standards,[20] however, impose pumping restrictions during some of the high-flow periods. During wet years, high flows and the opportunity to divert those flows extend later in the spring than during dry years. In dry years, more unused capacity at the Delta pumps is available, and more transfer water can be moved through the Delta. The Project pumps would not begin to move EWA water until the fish have left the vicinity of the Delta pumps, as discussed in more detail in Section 9.2.4.2. Typically, EWA water would be moved through the Delta from July through September, although the Project operators could start moving EWA water in mid-June if fish were not in the area of the export pumps.

The asset acquisition types have associated date ranges (discussed in each section below) during which water may be transferred, depending on local conditions and Delta conveyance availability. The ranges listed cover the entire length of time when transfers may occur, but the transfers will not usually continue for the entire period. For example, if a reservoir takes approximately 1 month to release water, the range may include 3 months because water could be released at any time during that timeframe.

Shifting pumping to times that are less sensitive to fish would increase pumping during times when fish are absent, which sometimes requires increased Delta outflow to comply with water quality regulations in the Delta. Carriage water is defined as the additional water needed for Delta outflow to compensate for the additional exports made on behalf of a transfer to assure compliance with water quality requirements of the SWP and CVP. Generally, more water must be released during a transfer than could reach the pumps, as some of the transferred water flows to the ocean as Delta outflow. The Project Agencies computed the carriage requirements at 15 percent of the transfer volume for the 2001 summer transfer season and 20 percent for the 2002 summer transfer season (Pettit-Polhemus 2003b). EWA transfers from the Upstream from the Delta region would incorporate enough carriage water to maintain water quality within the Delta at without-EWA constituent levels. The EWA's process for incorporating carriage water is described in more detail in Chapter 5.

Transfers along the San Joaquin River are charged a 10 percent conveyance loss to include seepage and evaporation losses. The EWA agencies must factor Delta carriage and conveyance losses into the determination of the total amount of water that must be acquired to fully compensate for EWA actions to benefit fish and the environment.

[20] These standards include requirements from several biological opinions and the 1995 Delta WQCP, as defined in Section 2.3.1.1.

2.4.2.1.1 Stored Reservoir Water

The EWA Project Agencies could acquire water by purchasing surface water stored in reservoirs owned by non-Project entities (those that are not part of the CVP or SWP). To ensure that purchasing this water would not affect downstream users, EWA agencies would limit assets to water that would not have otherwise been released downstream. In most cases, the stored reservoir water sellers could demonstrate that they would have maintained water in storage without the transfer.

When the EWA purchases stored reservoir water, these reservoirs would be drawn down to lower levels than without the EWA, as shown in Figure 2-5. To refill the reservoir, a seller must prevent some flow from going downstream. Sellers must refill the storage at a time when downstream users would not have otherwise captured the water, either in downstream Project reservoirs or with Project pumps in the Delta. Typically, refill could only occur during Delta excess conditions (when there is more water than the Projects can pump).[21] Refill criteria have been established for non-Project reservoirs to prevent EWA purchases from affecting downstream users; Section 4.2.3 describes these criteria in more detail. Stored reservoir water is released in addition to reservoir water that would be released without the EWA, thereby increasing flows in downstream waterways.

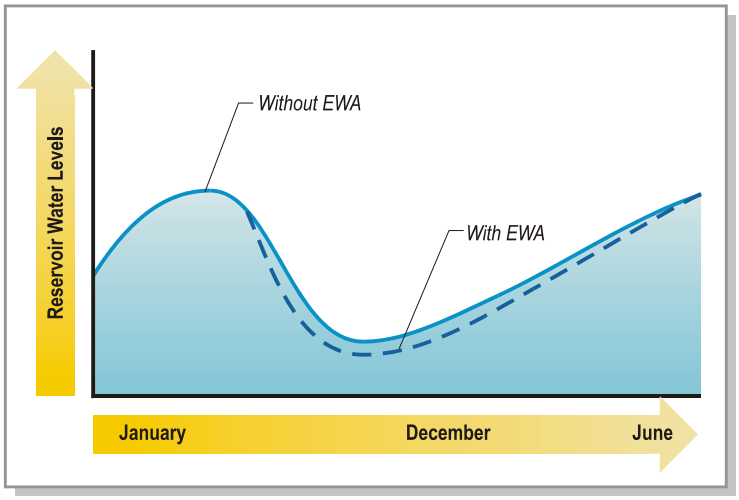

Figure 2-5
Reservoir Level Changes Due to Stored Reservoir Water Purchases

The EWA Project Agencies may purchase stored reservoir water from Oroville-Wyandotte Irrigation District (Sly Creek and Little Grass Valley Reservoirs), Yuba County Water Agency (New Bullards Bar Reservoir), and Placer County Water Agency (French Meadows and Hell Hole Reservoirs). The sections below describe operations associated with each of these potential acquisitions.

Feather River

Oroville-Wyandotte Irrigation District has multiple reservoirs as part of its South Fork Project and would sell water to the EWA out of Little Grass Valley and Sly Creek Reservoirs (see Figure 2-6). Water from Little Grass Valley Reservoir would flow through the South Fork Diversion tunnel into Sly Creek Reservoir. Sly Creek Reservoir receives water from upstream tributaries, Little Grass Valley, and Slate Creek (a tributary to the Yuba River). The water from Sly Creek Reservoir would pass into Lost Creek Reservoir, where it would enter a series of tunnels to generate power

[21] Delta excess water conditions, also referred to as unbalanced conditions, are defined in the Coordinated Operation Agreement as "periods when it is agreed that releases from upstream reservoirs plus unregulated flow exceed Sacramento Valley in basin uses, plus exports."

between Lost Creek and Ponderosa Reservoirs. The water released from these reservoirs would not typically enter the South Fork of the Feather River or Lost Creek as it flows downstream to Lake Oroville.

Oroville-Wyandotte's water is available from October to December, prior to the typical EWA transfer season and the time when the assets would be used, so it would be stored in Lake Oroville through the winter and into the following summer when the Delta pumps have available capacity.

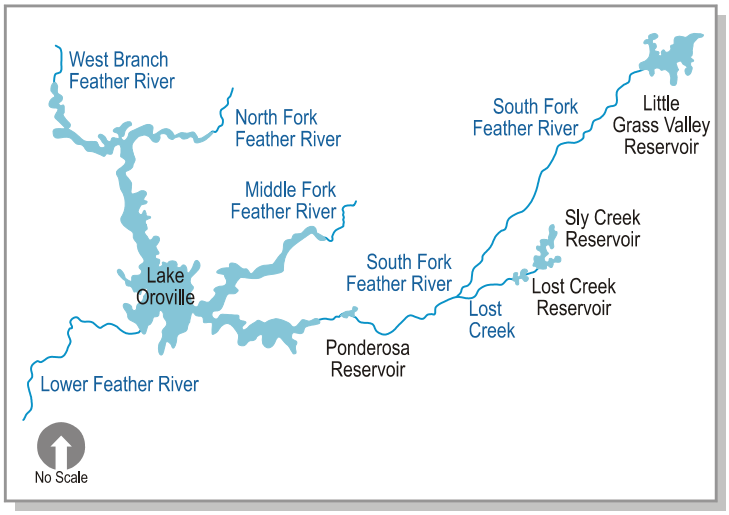

Figure 2-6
Feather River Water Facilities

As a result of an acquisition from Oroville-Wyandotte Irrigation District, water levels in Sly Creek and Little Grass Valley Reservoirs would be lower than under non-EWA conditions from when the transfer occurred until the reservoirs refill. Lake Oroville would store the releases until the following summer, increasing Oroville water elevations relative to non-EWA conditions from October until September. The acquisition water would be released from Lake Oroville in mid-June through September, increasing downstream flows over the conditions without the EWA.

Sly Creek and Little Grass Valley Reservoirs would refill, as excess water is available, decreasing releases from these reservoirs. Of the releases from these reservoirs that exceed the required downstream flows, most are diverted into the power generation facilities; therefore, refilling the reservoirs should not change riverflows. Sly Creek, however, receives some water from Slate Creek, a tributary of the Yuba River, and refill may also affect the Yuba River.

This pattern of releases results in EWA water stored in Lake Oroville through the wet season, but as the EWA has the lowest priority for storage, EWA assets would be the first to spill if the reservoir storage reaches flood control levels. This option carries a risk that the assets may not be available in the spring. As part of the purchase contract, the EWA agencies would include a "spill protection term" to ensure that if the water spills from Oroville, the EWA would not have to pay for it.

Yuba River

Yuba County Water Agency would sell water to the EWA from New Bullards Bar Reservoir, on the North Fork of the Yuba River. These acquisitions would be stored in New Bullards Bar Reservoir until the Delta pumps have available capacity to transfer the water south. Once released from New Bullards Bar Reservoir, the water would travel through a series of tunnels to generate power and enter the upstream end of Englebright Lake (Figure 2-7).

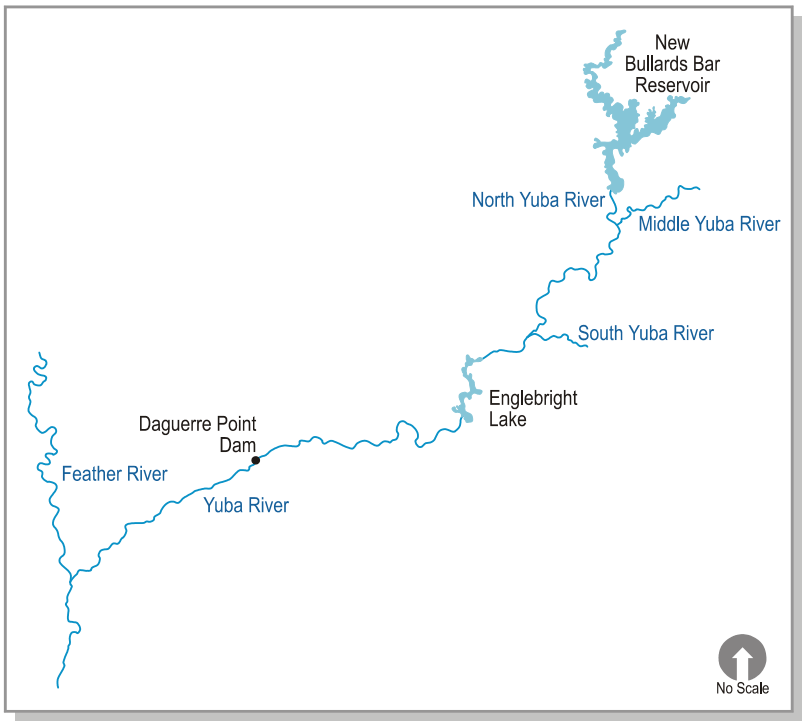

Figure 2-7
Yuba River Water Facilities

Withdrawing water from the reservoir would lower the surface water elevations relative to the non-EWA conditions from mid-June until the reservoir is refilled. If assets were released in mid-June through September, flows would increase in the Yuba River downstream from Englebright Lake. New Bullards Bar Reservoir would refill as water is available in the Yuba River, which would decrease flows downstream from the reservoir.

American River

Placer County Water Agency would sell water to the EWA Project Agencies from Hell Hole and French Meadows Reservoirs, on the Middle Fork of the American River (see Figure 2-8). It would take the agency 2-3 months to move the water downstream to Folsom Lake, where the water could be held until the EWA agencies are ready to release it. The water would be released from Hell Hole and French Meadows as early as June and until as late as October. Hell Hole and French Meadows would have lower surface water elevations than they would without the EWA from June until the reservoirs refill. Refilling the reservoirs would decrease flows downstream from the Ralston Afterbay.

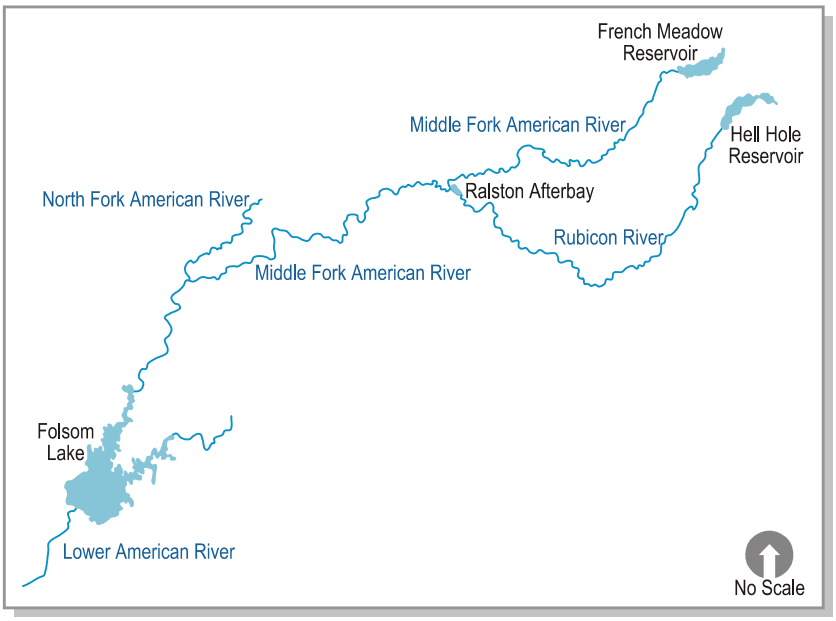

Figure 2-8
American River Water Facilities

Water from both French Meadows and Hell Hole Reservoirs would enter a series of tunnels through power generation facilities, and these tunnels would release the water at Ralston Afterbay. While water is being released, the Middle Fork of the American would convey increased flows from Ralston Afterbay downstream to Folsom Lake. These releases could occur from June through October. Folsom Lake would hold the water until the EWA agencies are ready for it to be released. Folsom Lake elevations would be higher with the EWA water than would be the case without the water. As the EWA assets were released, the lake level would be restored to the non-EWA levels.

On the American River, the EWA agencies may use assets to accomplish instream objectives and may move assets to users downstream from the Delta to make up for pumping reductions. If used for additional instream flows, the water may be released at a time when it could not be pumped through the Delta. During the summer (mid-May to mid-October), water may be released for steelhead temperature requirements. Additional instream flows are needed in October to December for Chinook salmon and steelhead spawning. The EWA agencies would release the water from Folsom to meet these multiple objectives, resulting in release periods from June through December.

2.4.2.1.2 Groundwater Substitution

Groundwater substitution transfers occur when users forego their surface water supplies and pump an equivalent amount of groundwater as an alternative supply. Because the EWA's potential groundwater substitution transfers are from agricultural users, the water from this acquisition method would be available during the irrigation season of April through October. Typically, surface water made available through groundwater substitution is stored upstream until the Delta pumps have the capacity available for EWA assets (except on the Sacramento River, as described later).

Groundwater substitution transfers would withdraw additional water from the groundwater basin below the participating users, so this option could only be used in basins that are not in a state of groundwater overdraft, or in areas where the water supplier determines that the water transfer would not contribute to the groundwater overdraft.[22] (Groundwater overdraft is discussed in more detail in Chapter 6, Groundwater Resources.)

The Delta pumps would be unlikely to have available capacity for the EWA at the start of the irrigation season. EWA water that would have been released for irrigation would instead be held in reservoirs until later in the season, which would cause reservoir levels to be slightly higher than without the EWA while the water is held back (except on the Sacramento River, as described later). The reservoir levels would not reverse their typical summer declines because the EWA would not add new water to the reservoir; rather, the levels would decrease more slowly (see Figure 2-9). EWA water acquired through groundwater substitution would be released later in the irrigation season, typically mid-June through September, at times when Delta pumping capacity is available. The change in reservoir elevations as the water is released would depend on the Delta conveyance capacity. If the conveyance capacity were available constantly throughout the period of mid-June through September, then the reservoir elevations would slowly return to the without-EWA levels (see Scenario 1 on Figure 2-9). If more conveyance capacity were available in July than later in the summer, then the EWA could borrow water from the storage facility and release additional water at those times that the conveyance capacity is available (see Scenario 2 on Figure 2-9). The Projects would determine if the EWA could borrow water on a case-by-case basis.

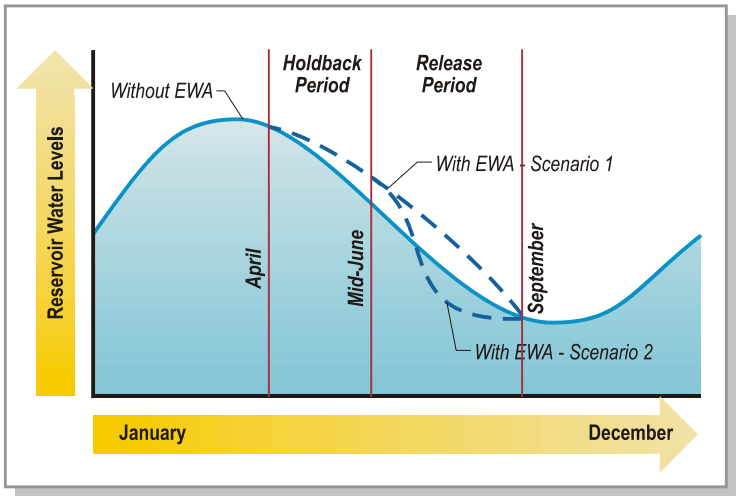

Figure 2-9
Reservoir Level Changes Due to Groundwater Substitution Transfers

[22] According to California Water Code 1745.10: A water user that transfers surface water pursuant to this article may not replace that water with groundwater unless the groundwater use is either of the following:
(a) Consistent with a groundwater management plan adopted pursuant to state law for the affected area.
(b) Approved by the water supplier from whose service area the water is to be transferred and that water supplier, if a groundwater management plan has not been adopted, determines that the transfer will not create, or contribute to, conditions of long-term overdraft in the affected groundwater basin.

The EWA Project Agencies may engage in groundwater substitution transfers with Glenn-Colusa Irrigation District, Reclamation District 108, Natomas Central Mutual Water Company, Anderson Cottonwood Irrigation District, Western Canal Water District, the Joint Water Districts,[23] Garden Highway Mutual Water Company, Yuba County Water Agency, and Merced Irrigation District. The sections below describe operations associated with each of these potential acquisitions.

Sacramento River

Sacramento River agencies (Glenn-Colusa Irrigation District, Reclamation District 108, and Natomas Central Mutual Water Company) receive CVP water that is stored upstream from their service areas in Lake Shasta, a CVP facility. While theoretically possible, the EWA agencies would probably not be able to reduce releases from Lake Shasta to store water until Delta pumps were available because all of the flow released from Lake Shasta is typically needed to meet downstream temperature requirements or the flow requirement at Wilkins Slough.[24] There is a possibility that EWA water could be held back in Lake Shasta during certain years (usually dry or critical years) when releases are not needed to meet downstream requirements. In most years, however, the EWA would ask that agencies agreeing to groundwater substitution transfers only transfer water when the Delta pumps have available capacity (where irrigators would continue to use their surface water supply until about June, then switch to groundwater). Less water would be available with this strategy than with others, but the water has a higher likelihood of being usable for EWA actions. It would be possible for each scenario to occur in different year types.

If water were held back in Lake Shasta, the water surface elevations during the hold-back period (April through June) would be slightly higher than they would be without the EWA. As the water is released, the reservoir levels may be higher or lower than the without-EWA levels and would slowly return to the without-EWA levels by the end of September. The river between Shasta and the water agencies' usual diversion point would convey less water than it would without the EWA during the hold-back period (April through June) because the EWA water would be held in Shasta. Flows would not decrease below those needed for flow or temperature requirements. The river would then carry more water than during non-EWA conditions in mid-June through September, when the Delta pumps have availability for EWA water.

If users shift from surface water to groundwater after the Delta pumps are available, the riverflows would not decrease because no water would be held back in Shasta. Riverflows would increase from the water agencies' usual diversion point downstream to the Delta pumps. The effect analysis focuses on the option of holding water back because the analysis includes the potential adverse effect of decreasing riverflows as well as increasing riverflows when the Delta pumps have available capacity.

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[23] The Joint Water Districts include four member districts that have a joint operating agreement with DWR. The Joint Water Districts include Butte Water District, Biggs-West Gridley Water District, Sutter Extension Water District, and Richvale Irrigation District.

[24] These requirements are described in detail in the Modeling Description, Attachment 1.

Feather River

The Feather River districts, including the Western Canal Water District and the Joint Water Districts, receive SWP water stored in Lake Oroville (an SWP facility). Water levels in Lake Oroville would be higher than without the EWA from April through June, while water would be held back because of Delta pump unavailability. The water levels in Lake Oroville may be lower or higher than without the EWA from July to September, depending on when cross-Delta conveyance is available. These districts do not divert from the river, but rather divert water that is released from Lake Oroville directly into the Thermalito Afterbay (see Figure 2-10). This water does not flow through the river in the absence of the EWA, so an EWA acquisition would not change riverflows if the SWP held EWA assets in Lake Oroville early in the season. The assets would be conveyed through the river later in the season (from mid-June through September), when the Delta pumps are available, increasing flows over the conditions without the EWA.

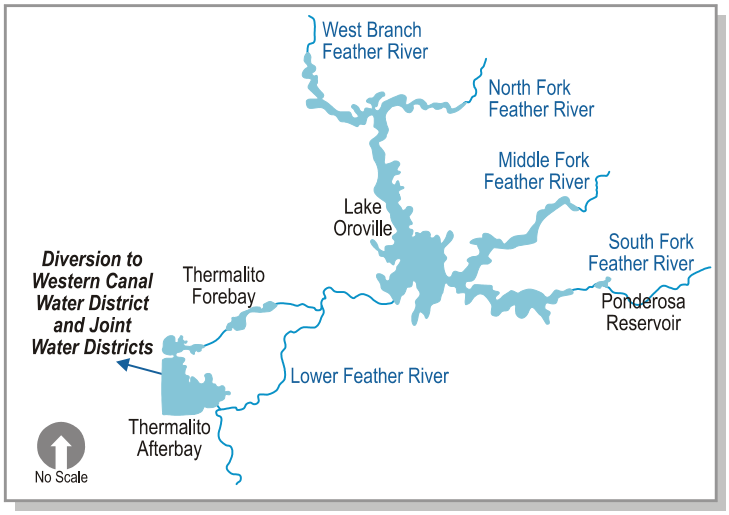

Figure 2-10
Diversion Locations for Feather River Sellers

Yuba River

Yuba County Water Agency, on the Yuba River, owns New Bullards Bar Reservoir and would store groundwater substitution assets there until release. Water elevations in New Bullards Bar Reservoir would be slightly higher than without the EWA from April through June as a result. During the release period, the EWA agencies would try to maintain relatively constant flows on the Yuba River because of fish concerns; therefore, the water levels in New Bullards Bar Reservoir would stay higher than the levels without the EWA from July to September. Many of the Yuba County Water Agency's customers divert at Daguerre Point Dam, which is downstream of New Bullards Bar Reservoir. Flows between New Bullards Bar Dam and Daguerre Point Dam would decrease relative to the conditions without the EWA early in the season (April through mid-June). Flows downstream from New Bullards Bar Dam would increase relative to the conditions without the EWA later in the season, when the Delta pumps have availability (mid-June through September).

Merced River

The Merced Irrigation District is on the Merced River and would store EWA water in its reservoir, Lake McClure, until release (see Figure 2-11). Water elevations in Lake McClure would be slightly higher from April through November than they would be without the EWA. The EWA agencies would convey a Merced Irrigation District groundwater substitution transfer through the Merced and San Joaquin Rivers. EWA agencies have worked together to schedule these transfers for periods when the transfer would reach the Delta with minimal losses and the temperature would be acceptable for fish migration. Assets would be transferred via the rivers in October and November, increasing flows during those times and providing an attraction flow for spawning salmon.

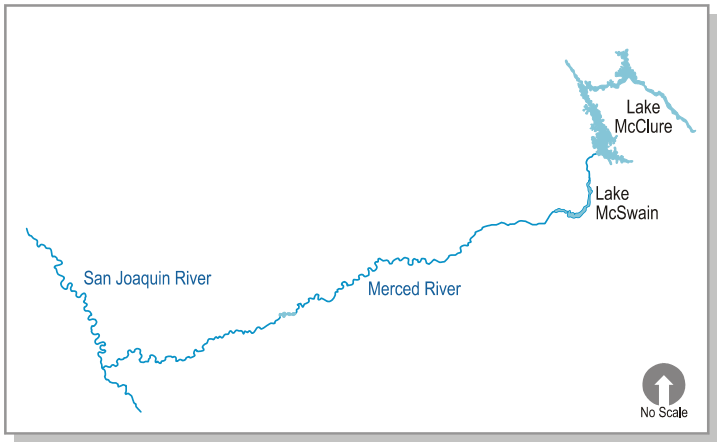

Figure 2-11
Merced River Water Facilities

2.4.2.1.3 Crop Idling or Crop Substitution

Crop idling transfers come from water that would otherwise have been used for agricultural production. For crop idling acquisitions, the EWA agencies would pay farmers to idle land that they would otherwise have placed in production. Crop idling acquisitions would be retained in reservoirs upstream from the selling water agencies until they could be transferred through the Delta and pumped south. Payment by the EWA agencies for water transferred would be computed based on pre-agreed consumptive use values, which may be refined as the science for generating these values improves. The EWA agencies are considering purchasing water from idled rice crops only in the Upstream from the Delta Region for several reasons:

- Rice provides the largest amount of water per acre idled (approximately 3.3 acre-feet per acre);
- Rice crops are less labor-intensive than other potential crops, requiring approximately 2.7 full-time labor equivalents per 1000 acres;
- Rice farmers have expressed interest and have participated in idling programs in the past; and
- Like other small grain crops, rice is not a permanent crop and brings in less revenue than permanent, horticultural crops (e.g., fruits and nuts), so farmers would likely be more willing to idle land.

The potential also exists for the EWA agencies to purchase water through crop substitution, in which water users substitute a crop with lower water needs than the crop that they would have otherwise planted. The associated decrease in water use could be transferred to the EWA or other programs. Crop substitution would have

similar but lesser effects than crop idling, so it is considered to be a part of the crop idling discussion for the remainder of the document.

To minimize socioeconomic effects on local areas, the EWA agencies would not purchase water via crop idling if more than 20 percent of recent harvested rice acreage in the county would be idled through EWA water acquisitions. The EWA agencies chose this figure because of historical precedents and Water Code Section 1745.05 (b).

- The agricultural industry experiences normal variation in crop acreage; therefore, agricultural economies and local public services adapt to address this variation. Historical amounts of idled rice vary year-to-year by close to 20 percent, which indicates that the local economy has adjusted to similar amounts of rice idling.
- Water Code Section 1745.05 (b) requires a public hearing under some circumstances where water from land idling exceeds 20 percent of the water that would have been applied or stored absent the water transfer.

Section 11.2.3 includes a more detailed discussion of the reasons for the 20 percent limitation on rice idling.

The EWA Project Agencies may purchase water through crop idling transfers from Glenn-Colusa Irrigation District, Reclamation District 108, Western Canal Water District, and the Joint Water Districts.

The mechanisms for transferring water from crop idling would be very similar to those described above for groundwater substitution. The transferred water would be held in reservoirs during months when it could not be pumped through the Delta export pumps, then released during the months when the Delta pumps have availability.

Sacramento River

The EWA Project Agencies could purchase water through crop idling from Glenn-Colusa Irrigation District and Reclamation District 108 on the Sacramento River. As described above for groundwater substitution transfers, releases from Lake Shasta would probably need to be maintained during April and May to meet downstream temperature and flow requirements. Therefore, water acquired from sellers on the Sacramento River could not be backed up into Lake Shasta and cannot be transferred until the Delta pumps are available to the EWA. Unlike groundwater substitution, farmers could not postpone crop idling until June. Crop idling water would be available at the beginning of the season as soon as the crop is not planted. The EWA agencies would likely receive less water from crop idling transfers along the Sacramento River than from crop idling transfers along other rivers because the water made available along the Sacramento River in April, May, and possibly June might not be pumpable in the Delta. The modeling efforts indicate that the EWA agencies could not capture and use approximately 30-50 percent of the water, except in extremely dry years when added flows in April and May would provide systemwide benefits that the EWA agencies could use.

Feather River

Crop idling transfers from Western Canal Water District and the Joint Water Districts on the Feather River would function in the same way as transfers from groundwater substitution. Water elevations in Lake Oroville would be higher than they would be without the EWA during the April through June holdback period. From July to September, the levels would be higher or lower than they would be without the EWA, depending on the through-Delta conveyance capacity. The participating districts do not divert water directly from the Feather River, but instead divert water that is released from Lake Oroville directly into the Thermalito Afterbay. This water does not flow through the river without the EWA, so an EWA acquisition would not change riverflows if assets were held in Lake Oroville early in the season. Riverflows would increase when the Delta pumps have availability, typically during July through September.

2.4.2.1.4 Stored Groundwater Purchase

The EWA Project Agencies could obtain water by purchasing groundwater assets that were previously stored by the selling agency with the intent to sell a portion of those assets at a later date. This option differs from groundwater substitution in that groundwater substitution transfers would not come from water that had been previously stored. In the Upstream from the Delta Region, the EWA Project Agencies may purchase previously stored groundwater from the Sacramento Groundwater Authority (SGA).

American River

The EWA Project Agencies would purchase water from the SGA, which would deliver water through an exchange at Folsom Lake. Agencies in the authority would exchange some of their allotment in Folsom Lake with the EWA and pump previously stored groundwater[25] within their agencies to make up for the decrease in surface water supply. Any members of the Sacramento Groundwater Authority may participate; potential participants include San Juan Water District, the City of Sacramento, Fair Oaks Water District, and Citrus Heights Water District.

San Juan Water District withdraws and treats water for itself, the Fair Oaks Water District, Citrus Heights Water District, and some other SGA members, directly from Folsom Lake; this water does not enter the lower American River (see Figure 2-12). SGA agencies would begin pumping groundwater and transferring surface water to the EWA once Reclamation is certain that Folsom Lake would not spill water, usually May at the earliest. The transfer could continue until mid-October, when the CVP would need to start preparing for flood control requirements and minimum flow requirements on the river. The EWA agencies would move the assets downstream through the Lower American River from June through December, depending on Delta pump availability and instream needs on the American River, as described above for stored reservoir purchase. This transfer would cause a slight increase over non-EWA

[25] If the EWA agencies enter into a contract with Sacramento Groundwater Authority, the EWA agencies would verify that the water was previously stored to prevent effects to local groundwater.

conditions in Folsom Lake surface water elevations starting in May (before the Delta pumps are available). Reservoir surface levels would return slowly to the non-EWA conditions, as the water would be released completely by December. Flows in the lower American River would be increased over non-EWA conditions from June through December during the transfer.

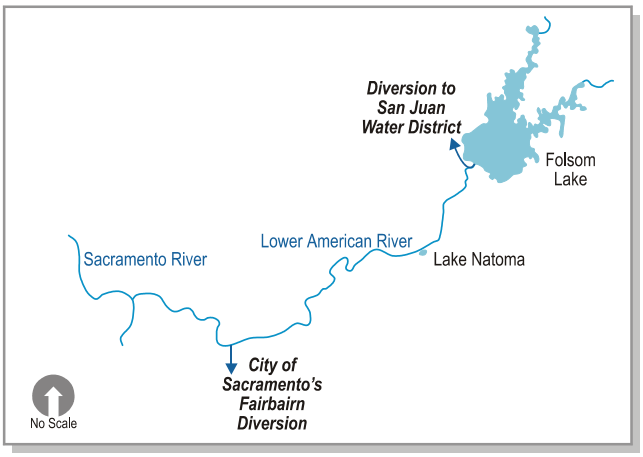

Figure 2-12
Diversion Locations for SGA Participants

The City of Sacramento would reduce its diversions at its Fairbairn diversion point, shown on Figure 2-12. The city would not start pumping groundwater and transferring its surface water until Delta pumping capacity became available, typically starting in June. Releases from Folsom Lake would maintain the same pattern as before the transfer, but the transferred portion of Sacramento's water would flow to the Delta instead of being diverted. This type of transfer would cause no change in Folsom Lake, but flows in the American River below Fairbairn would increase June through September.

2.4.2.2 Delta Area

The EWA Operating Principles specify methods for gaining assets in addition to those described above. These additional methods do not involve active acquisition; assets obtained by these other methods are termed "variable assets." The EWA agencies could obtain variable assets (water or pumping capacity) through changes in Delta operations.

The CALFED ROD lists the quantities of each of these assets that were expected to be available. During the past 2 years of EWA operation, the Project Agencies have found that some of these assets are not available on the same pattern as predicted by the CALFED ROD (shown in Table 2-6). Variable asset acquisition may be different because real conditions vary somewhat from the assumptions used to predict asset amounts (as is true for Export/Inflow Ratio Relaxation) or because conditions have changed since the predictions were completed. For example, the first variable asset involves acquiring (b)(2) water that has been released to meet instream flow objectives, but is diverted by the SWP because of limitations of the CVP's pumping capacity. Such flows may occur less often than the CALFED ROD predicted and less than in past years because of changes in (b)(2) water accounting imposed as a result of legal decisions (see Chapter 1 for a more detailed explanation).

Table 2-6
Acquired Variable Assets

Variable Asset Type	CALFED ROD Estimate of Quantity	Acquired EWA Water from 10/2000 - 9/2001[26]	Acquired EWA Water from 10/2001 – 9/2002
EWA share of (b)(2)/ERP Upstream Releases	40,000 acre-feet	46,079 acre-feet	3,308 acre-feet
Export Inflow Ratio Relaxation	30,000 acre-feet	1,829 acre-feet	79,306 acre-feet

Source: Pettit-Polhemus 2003a

2.4.2.2.1 Sharing of (b)(2) and ERP Water

The SWP and the EWA would share, on a 50-50 basis, water pumped by the SWP that meets the following requirements:

- Water released from storage or made available for upstream purposes under either (b)(2) or the ERP, arrives in the Delta with no further (b)(2) or ERP purposes to serve, and exceeds the export capacity of the CVP Tracy pumping plant;
- Water that the SWP and/or EWA have demand for south of the Delta; and
- Water the SWP has capacity to pump.

This type of variable asset would result in additional water for the EWA.

2.4.2.2.2 Joint Point of Diversion

The SWP could use excess capacity at its Harvey O. Banks Pumping Plant to pump water for both the CVP and the EWA, to be shared on a 50-50 basis, if the Projects meet the conditions in D-1641 (described in Section 2.3.2.1.1). The CVP water could be from either storage or the CVP's Delta water rights (to divert excess water). The EWA water could be from either non-Project water acquired Upstream from the Delta or stored or unstored water pumped under CVP or SWP water rights. If either the CVP or EWA were demand-limited,[27] the other's use of the Joint Point of Diversion would not count against its 50 percent share.

As stated in the EWA Operating Principles Agreement, use of excess capacity at Banks for the EWA and CVP would take precedence over all other non-Project pumping, except water wheeling in response to facility outages and wheeling to supply CVP contractors for whom the SWP has traditionally wheeled water. Pump

[26] These numbers do not reflect conveyance losses from the pumping facilities to San Luis Reservoir. The CALFED modeling that produced the ROD estimates did not account for these losses; therefore, they are not included in the EWA numbers to provide accurate comparisons.

[27] A project is demand-limited if there are no contractors that want any more water than they are receiving currently and if available storage facilities and/or conveyance facilities are full.

usage for the EWA Operating Principles Agreement would be on an equal priority with Level 4 refuge supplies.[28]

The Project Agencies could use the Joint Point of Diversion to move EWA assets through the Delta, but the EWA agencies would still need to provide the assets to move. The Projects also have water rights to divert excess flows in the Delta, and the EWA Operating Principles Agreement allows the EWA to use these rights if excess pumping capacity and flows are available.

2.4.2.2.3 Relaxation of the Section 10 Constraint

As discussed in Section 2.3.2.1.2, the USACE granted permission to the SWP to relax the Section 10 constraint (of the Rivers and Harbors Act) and increase the base diversion rate by the equivalent of 500 cfs to an average of 7,180 cfs for the months of July through September, through 2002. If similar permission were obtained, this 500 cfs would be dedicated to pumping for the EWA, but the EWA agencies would still need to provide the assets to be pumped. During wet years, this conveyance capacity would likely be the only capacity available to the EWA. The conveyance capacity would yield approximately 50,000 to 60,000 acre-feet per year, depending on operational restrictions.

2.4.2.2.4 Relaxation of the Export/Inflow Ratio

Under the SWRCB's D-1641 and Orders 2000-10 and 2001-5, Project exports are limited at certain times of the year to a percentage of Delta inflow, usually 35 or 65 percent. This limitation is called the Export/Inflow, or E/I, ratio. Both D-1641 and the 1995 Water Quality Control Plan, consistent with the 1994 Principles for Agreement (Bay-Delta Accord), allow for these ratios to be relaxed when certain requirements are met. The EWA agencies would seek relaxation of the E/I ratio as appropriate to create EWA assets in the export service areas. By relaxing the E/I ratio, it was estimated that the EWA could export an annual average of 30,000 acre-feet, but amounts could be greater in some years.

2.4.2.3 Export Service Area

The Export Service Area include the areas served by the CVP and SWP Delta pumping facilities, encompassing agricultural and urban development in the Central Valley and central and southern coasts**.**

The EWA Project Agencies could acquire assets from sources within the export service areas. The EWA agencies would not need to arrange to move these assets through the Delta. This advantage is especially important during wet years, when Delta pumping capacity for the EWA is limited because the export pumps are fully utilized to move Project water. Assets purchased in the export service areas, however, are often more expensive than other assets because potential sources in the export

[28] The Central Valley Habitat Joint Venture defined four levels of refuge water supplies: existing firm water supply (Level 1), current average annual water deliveries (Level 2), full use of existing development (Level 3), and full habitat development, by permit (Level 4). CVPIA Section 3406(d) directed the Secretary of the Interior to provide firm water through long-term contractual agreements for Level 2 refuges.

service areas are more limited; water agencies usually are paying for facilities needed to capture and convey the limited supplies.

2.4.2.3.1 Water Acquisition Types

The EWA Project Agencies have two potential methods for acquiring water in the export service areas, crop idling and stored groundwater purchase, as described below.

Crop Idling or Crop Substitution

Crop idling transfers in the export service areas also involve agricultural water users leaving their fields idle and selling their surface water allotment to the EWA. Sellers in this area normally receive CVP or SWP water that is stored in San Luis Reservoir or pumped directly out of the Delta. The EWA agencies are considering purchasing water from idled cotton fields for several reasons:

- Cotton farmers have shown a willingness to sell water to the EWA;
- Cotton is less labor-intensive than other potential crops, requiring approximately 6.6 full-time labor equivalents per 1,000 acres;
- Unlike cotton, most other crops in the region are permanent crops; and
- Most other farmers in the region raise crops that produce more profit than cotton per acre and therefore would be less willing to sell to the EWA than cotton farmers because the profit from selling water would not be attractive enough to idle land.

To minimize socioeconomic effects on local areas, the EWA agencies would not purchase water via crop idling if more than 20 percent of recent harvested cotton acreage in the county would be idled through EWA or other program water acquisitions. As discussed in Section 2.4.2.1.3, the EWA agencies chose this figure because of historical precedents and Water Code Section 1745.05 (b). Section 11.2.3 includes a more detailed discussion of the reasons for the 20 percent limitation on cotton idling.

Policy and regulatory barriers restrict crop idling in certain areas, including those areas that receive water from the SWP. The long-term water supply contracts allow interested SWP contractors to sell some of their allocated Table A[29] amounts to a "turn-back pool" for purchase by other interested SWP contractors or DWR (or by non-contractors if DWR does not want the water). The SWP contracts do not allow contractors to sell water for use outside their service area. While water stored under ground in the Export Service Area may be SWP water, CVP flood flows, or Kern River

[29] Table A is a tool for apportioning available supply and cost obligations under the SWP contract. When the SWP was being planned, the amount of water projected to be available for delivery to the contractors was 4.2 million acre-feet (maf) per year. Table A lists by year and acre-feet the portion of the 4.2 maf deliverable to each contractor. The Table A amounts are not an indication of the SWP water delivery reliability, nor should these amounts be used to support an expectation that a certain amount of water will be delivered to a contractor in any particular timespan.

Flows, the Kern groundwater storage projects have stored primarily SWP water, having anticipated that local water users would use it. As discussed earlier, the SWP contracts prohibit any contractor's sale of SWP water to other parties, except for the Monterey Amendment's turnback pool arrangement for other SWP contractors and DWR. Monterey Amendments specify that contractors who store SWP water outside their service area cannot sell water in the turnback pool. To help EWA during its start-up phase, Kern County Water Agency sold SWP water stored in 1995 through 1999, when SWP contractor's received 100% of their requests for SWP water. Although SWP contracts prohibit sale of SWP water by contractors, DWR concluded that sale of stored SWP water from the 1995 to 1999 period did not have any adverse impacts on other SWP contractors.

The EWA Project Agencies may purchase water through crop idling transfers from Kern County Water Agency, if these regulatory and policy barriers are removed. The EWA agencies also could purchase water through crop idling transfers from Westlands Water District and Tulare Lake Basin Water Storage District. Any of these areas could also participate in crop substitution transfers, as described in Section 2.4.2.1.3, which are included as part of crop idling transfers because they would produce similar but lesser effects.

In the export service areas, the EWA agencies would receive crop idling water at O'Neill Forebay (adjacent to San Luis Reservoir) on the same schedule that would have otherwise been employed for water user deliveries. Operations in conjunction with San Luis Reservoir will be discussed in greater detail in Section 2.4.2.3.2, Borrowed Project Water.

Stored Groundwater Purchase

Stored Groundwater Purchases in the export service areas would function in the same way as the upstream stored groundwater purchases (Section 2.4.2.1.4), in which entities would sell water to the EWA that they had previously stored in the ground. The EWA agencies could receive this water through two mechanisms:

- The selling agency could exchange its surface water allocation with the EWA and pump stored groundwater to satisfy local needs; or

- The selling agency could pump water out of its aquifer directly into the California Aqueduct for transfer to the EWA.

Stored groundwater is available to the EWA year-round, although the delivery would generally be during the irrigation season, usually April through September, if the water were delivered through surface water exchange.

The EWA Project Agencies may purchase stored groundwater from projects within Kern County. Several agencies have stored excess surface water in projects in the Kern County groundwater aquifer. Several projects in Kern County have stored groundwater that could be sold to the EWA:

- **Kern Water Bank:** water stored by a Joint Powers Authority consisting of local water agencies.

- **Pioneer Banking Project:** a coalition of local agencies recharges and recovers water. Kern County Water Agency could sell part of its 25 percent share of stored water to the EWA.

- **Berrenda Mesa Project:** Berrenda Mesa Water District owns this project in partnership with several other local agencies and could sell water if it chose to participate.

In addition, Semitropic Water Storage District and Arvin-Edison Water Storage District operate water storage facilities. These districts do not store their own water, but instead engage in agreements with outside parties. These external groups provide surface water for storage underground and pay a fee to the districts to store the water. The EWA Project Agencies could purchase water from the parties that store water in Semitropic or Arvin-Edison. Santa Clara Valley Water District has water in storage in Semitropic that it could sell to the EWA, and Metropolitan Water District of Southern California has water in Semitropic and Arvin-Edison. These projects, as well as the three banking projects listed above, are described in greater detail in Chapter 6, Groundwater Resources.

Although water stored underground in the Export Service Area may be SWP water, CVP floodflows, or Kern River floodflows, the Kern groundwater storage projects have primarily stored SWP water, anticipating that local water users would use it. As discussed earlier, the Monterey Amendment specifies that unused SWP water should go to the turnback pool for other SWP contractors. The SWP water that was stored within Kern County did not first go to the turnback pool, creating regulatory concerns with selling that water to a non-SWP contractor. To help the EWA during its startup phase, Kern County Water Agency has sold SWP water stored in 1995 through 1999, when SWP contractors received 100 percent allocations. DWR and other SWP contractors agreed to this stipulation before Kern County Water Agency sold the water to the EWA, but agreed that it would only apply to water sold to DWR for the EWA.

With current SWP policies, Kern projects would not be able to sell SWP water that was stored during other years when allocations were not 100 percent. Without additional water to recharge, it is likely that Kern County Water Agency would have less water available to sell to the EWA in upcoming years. This issue is discussed in greater depth in Chapter 6, Groundwater Resources, which includes a discussion of the amount of stored water from each of the different sources.

If the EWA agencies acquire stored groundwater through a transfer of the selling agency's surface water allocation, the exchange would be made at O'Neill Forebay. The EWA agencies would acquire water on the same delivery schedule that the selling agency would have had without the transfer. If the selling agencies pump groundwater directly into the California Aqueduct, the seller must work

cooperatively with DWR to ensure that the groundwater meets DWR's water quality requirements. Chapter 5 discusses this cooperative process and DWR's water quality requirements in more detail.

2.4.2.3.2 *Asset Management*

The EWA requires facilities and operational arrangements in order to make its assets available when needed for accomplishing EWA objectives. The CALFED ROD defined several tools to manage assets, including the ability to borrow Project water if needed and store it for use at a time other than when the asset was acquired. Project facilities and agencies assist the EWA by conveying, storing, and loaning water when possible.

Borrowed Project Water

Borrowing Project water is a management arrangement available to the EWA agencies, as long as the borrowed water could be repaid without affecting the current or following year's allocations and deliveries to Project contractors. Borrowing of Project water, specifically in San Luis Reservoir, is intended to enhance the effectiveness and use of EWA assets. Borrowing could take place only when the borrowed water would not exacerbate water quality and supply problems associated with the San Luis low point[30] and if the reservoir could still meet reasonable carryover storage objectives.

The EWA agencies would use borrowed Project water from the San Luis Reservoir in conjunction with Upstream-from-the-Delta transfers. If the Projects are unable to convey water through the Delta because of EWA pumping reductions, the EWA agencies could borrow water from San Luis Reservoir, provide it to Project Contractors during the reduction, then repay the water to the reservoir later by moving EWA assets from upstream reservoirs when the Delta pumps have

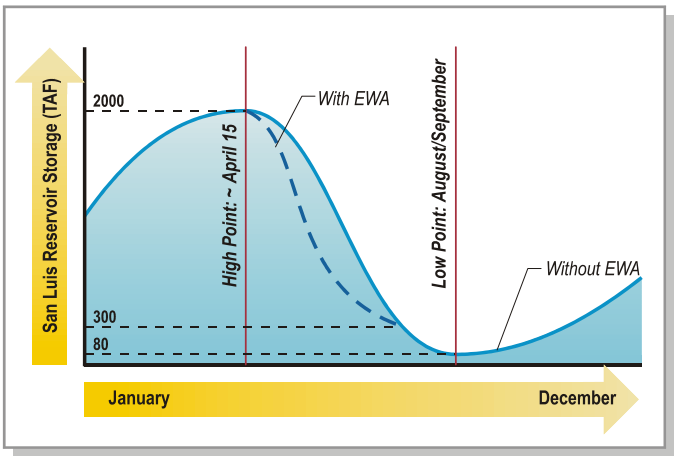

Figure 2-13
Reservoir Level Changes Due to Borrowing Water From San Luis Reservoir

30 The low point is the summertime seasonal lowest level of San Luis Reservoir. As the elevations in San Luis Reservoir approach the low point, the low point problem occurs when the volume of water in San Luis Reservoir drops to approximately 300,000 acre-feet. At 300,000 acre-feet of storage, algal blooms can cause water quality problems for urban water users that receive supplies, especially Santa Clara Valley Water District. Water quality concerns for industrial users start when the reservoir has only 300,000 acre-feet of storage, and the EWA is not allowed to cause the reservoir to reach this storage level sooner than it would without the EWA. If drawdown of the reservoir continues, CVP and SWP deliveries are no longer possible when the reservoir reaches "dead storage" at approximately 80,000 acre-feet.

capacity. (See Figure 2-13.) EWA agencies may thus at times carry a debt to the San Luis Reservoir that would affect water elevations in the reservoir.

Figure 2-13 illustrates a year in the San Luis Reservoir during which water is borrowed from the Projects. By borrowing water, the EWA agencies would decrease reservoir levels.

In addition to borrowing Project water, as described above, the EWA agencies could also borrow Project storage if space were available. Some EWA assets are available at times when they cannot immediately be used for fish actions, such as the variable assets described above. The EWA agencies could store these assets in San Luis Reservoir, but they would have the lowest priority for storage (other than water stored for non-Project entities). San Luis Reservoir fills in most years, so it is likely that the water would convert to Project water and no longer be available to the EWA.[31] Additionally, the EWA could borrow Project storage in other facilities, such as Lake Shasta, Lake Oroville, and Folsom Lake. The EWA agencies would typically use this option to store water over the winter, but this water would be the first to spill from the reservoir if the reservoir reached the flood control limits.

Groundwater Storage

The CALFED ROD states that the EWA agencies should purchase 200,000 acre-feet of storage (initially full) south of the Delta to provide initial assets and to store assets that have been acquired in excess of immediate needs. Groundwater storage requires the ability to percolate or inject the excess water into a groundwater basin for later extraction, or have Project water that could be transferred to the EWA as a mechanism to return the water to the EWA. Having facilities for groundwater storage of EWA assets would provide the EWA the flexibility to acquire and store water throughout the year, which would allow additional flexibility in asset acquisition.

Groundwater storage is different from the acquisition method of purchasing stored groundwater because the EWA agencies would be providing the assets to be stored (after the initial purchase of the full storage area). If the EWA agencies purchased stored groundwater, it would purchase water that the sellers had previously stored in the ground.

The groundwater storage would likely be operated with 100,000 acre-feet of flexible storage that could be exercised yearly or extracted in any one year and 100,000 acre-feet of water that would remain in storage as a backup supply.

Obtaining groundwater storage involves negotiating a lease agreement with an entity that operates a groundwater banking program. The agreement would require payment for use of recharge and extraction facilities, as well as charges for occupying or reserving the storage space. Assets stored in water banks are generally charged for

[31] If San Luis Reservoir had filled without the EWA, then the EWA would not be able to keep water in storage in that reservoir. EWA water would then convert to Project water.

losses upon both recharge and extraction. If the EWA agencies acquire water banking capacity, the assets would probably be charged a small percentage of loss representing basin losses. Upon extraction, similar losses would be applied.

Stored groundwater could be returned to the EWA through two mechanisms:

- The banking entity could extract the water out of the ground and into a waterway or Project conveyance facility; or

- The entity could transfer its surface water allotment to the EWA and pump groundwater for local use.

The EWA agencies have not yet acquired this groundwater storage, but have acquired additional assets to account for the lack of storage. The EWA Project Agencies may acquire groundwater storage services from Kern County Water Agency, Semitropic Water Storage District, and Arvin-Edison Water Storage District. The EWA Project Agencies could also negotiate groundwater storage services with Santa Clara Valley Water District or Metropolitan Water District of Southern California, which have water storage capacity in Semitropic and Arvin-Edison Water Storage Districts.

Source Shifting

Source shifting is a tool that was developed in the CALFED ROD to help make the EWA more flexible. With source shifting, the EWA agencies would borrow scheduled water from a Project contractor for a fee, returning the water at a later date. The result of this option is to delay delivery of SWP or CVP contract water.

The purpose of implementing source shifting would be to help protect the San Luis Reservoir against reaching storage volumes where the low point problem begins earlier with the EWA than it would have without the EWA. Source shifting would allow the EWA to borrow water from one or more Project contractors and use it to repay debts to the San Luis Reservoir before the low point problem has begun. The objectives of source shifting would be to prevent San Luis Reservoir from reaching the point at which it could not continue to make Project deliveries (approximately 80,000 acre-feet of storage) or at which water quality creates problems for contractors (approximately 300,000 acre-feet of storage) before it would have without the EWA.

If projections show that the EWA could cause San Luis Reservoir to reach 300,000 acre-feet of storage sooner than it would have without the EWA, then the EWA agencies would implement source shifting agreements. In some years, San Luis Reservoir storage would fall below 300,000 acre-feet without the EWA. In this situation, the EWA agencies would not be responsible for source shifting to bring storage back up to 300,000 acre-feet, but would only need to implement source shifting to bring the storage back up to the without-EWA levels.

To participate in source shifting, contractors must have storage from which to draw while their deliveries are delayed. The EWA agencies could engage in source shifting agreements with Metropolitan Water District of Southern California or Santa Clara

Valley Water District. Metropolitan Water District is considering using surface water reservoirs (Diamond Valley Lake, Castaic Lake, Lake Mathews, and Perris Lake) and groundwater storage programs to participate. Santa Clara Valley would use surface water storage within Anderson Reservoir. If source shifting were implemented in surface water storage facilities, it would cause the participating reservoir levels to fall earlier in the year than they would without the EWA, but the reservoir levels would return to levels that would occur without the EWA as the water is paid back (see Figure 2-14).

The EWA agencies could also create a source shifting agreement with Kern County Water Agency, which would use groundwater supplies during the delayed deliveries. Water from Kern County could be delivered by exchanging surface water deliveries or through direct groundwater pumping into the California aqueduct (as described in the Stored Groundwater Purchase section, above).

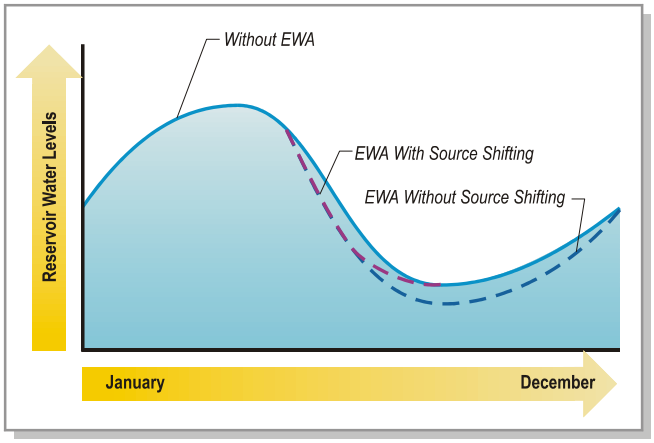

Figure 2-14
Reservoir Level Changes Due to Source Shifting

If the EWA agencies activated a source shifting agreement, the deferred surface water deliveries would be transferred to the EWA at O'Neill Forebay and could be stored in San Luis Reservoir. After the San Luis Reservoir reached its low point, source shift water could be returned to the Projects at O'Neill Forebay and then conveyed to those contractors that provided source shifting services (those that agreed to delay delivery of their contract water).

At the start of source shifting operations, water surface elevations in the reservoirs or groundwater basins used as the alternate supply source by the source shifting contractor would decrease relative to non-EWA conditions. The water levels would then return to non-EWA conditions as the water was paid back, which could continue into the next year. Source shifting does lower water levels temporarily, but only within existing operating parameters. The reservoirs or groundwater aquifers would not be operated outside their standard operations.

Pre-Delivery

As a permutation of source shifting, the EWA agencies could engage willing partners to receive water earlier than they would typically receive water. The EWA agencies would consider this tool if the EWA had water in storage in San Luis Reservoir during the winter that could convert to Project water as San Luis fills. To implement pre-delivery, the EWA agencies would deliver water to users in the Export Service Area that have their own storage facilities in which to store that water. The EWA would essentially be borrowing storage space from these users. This action would increase reservoir levels in surface storage facilities. The EWA Project Agencies may engage in

pre-delivery with Metropolitan Water District of Southern California or Santa Clara Valley Water District. In some cases, such as the Santa Clara Valley Water District's Anderson Reservoir, there may also be some risk of spill of the EWA asset that would be addressed through contract terms.

Exchanges

The EWA agencies could engage willing partners to receive water earlier than their normal delivery schedule. The EWA agencies would consider using this tool if they had remaining assets at the end of June and they did not anticipate using these assets before the end of the water year. In a dry summer period, the EWA could exchange its surplus assets with an agricultural contractor with the agreement that the contractor return the water on request in the next relatively wet year; for example, a year with SWP allocations of 70 percent or higher. The agricultural contractor would then take delivery of the EWA water from July through the end of the irrigation season instead of pumping local groundwater or drawing on other sources. The exchange would reduce groundwater pumping in the first year of the exchange, and would require the contractor to reduce dependence on contract supplies in the year of the return of the water.

Similarly, the EWA agencies could exchange surplus assets with a contractor that has available surface water storage. The contractor would take deliveries of the EWA water during the same time period instead of drawing on local surface water supplies. The exchange would result in slightly higher reservoir levels throughout the winter and until the contractor returns the water to the EWA in a relatively wet year.

Exchanges would have similar effects to other water management methods discussed in earlier sections. Exchanging water with an agricultural contractor to use in lieu of groundwater would result in the same types of effects as groundwater storage. Exchanging water with contractors that have surface water storage is similar to pre-delivery. The resource area analyses do not specifically analyze exchanges because these effects are covered as a part of the analysis of groundwater storage and pre-delivery.

2.4.3 Typical Year EWA Operations

In a typical year, the EWA would purchase 200,000-300,000 acre-feet for its annual operations. In the driest years, and when assets were carried over from the prior year, the total acquisitions could be closer to 200,000 acre-feet. In near average water years, the acquisition target would be closer to 300,000 acre-feet or even higher.

In the wetter years when operational curtailments would be expected to cost more water because the base Delta pumping rate would be higher or when the EWA ends the prior year with substantial debt, water needs for fish may be in the 400,000-600,000 acre-foot range. Initial acquisition targets may be lower in those years, and water acquisitions likely would reach the higher end of the range only if Tier 3 assets were called upon to complete the acquisition of the needed water. Tier 3 assets could be made available when Tier 2 assets were exhausted and the Management Agencies

determine that jeopardy would occur due to Project operations unless additional measures were undertaken.

Table 2-7 provides an analysis of possible operational ranges of the EWA under different year types as defined by the Sacramento River Index.[32] The table is based on EWA asset acquisition priorities identified by the EWA agencies (see Section 2.4.4) and upper limits for each source category defined in Table 2-5 of this document.

Table 2-7
Estimated EWA Acquisition Patterns Keyed to SWP Allocation, Cross-Delta Capacity, and Acquisition Priorities (Values in Thousand Acre-Feet)

Year Type	SWP Allocation	Purchase Target	Upstream from the Delta Sources				Export Service Area Sources	
			Reservoir Storage	Groundwater Substitution	Crop Idling	Groundwater Purchase	Groundwater Purchase	Crop Idling
Critical	20-40%	200-240	75-175	25-125	0-100	0-10	0-50	0-50
Dry	35-60%	210-270	75-175	25-125	0-100	0-10	0-150	50-100
Below Normal	50-80%	230-300	75-150	25-125	0-50	0-10	50-165	50-290
Above Normal	70-90%	250-300[1]	75-150	25-50	0	0	50-165	180-340
Wet	80-100%	250-300[2]	75-150	25-50	0	0	50-165	230-490

[1] In wetter years, purchases above 300 TAF may be required, depending on fish actions. Tier 3 assets may be required.
[2] In the wettest years, purchases above 300 TAF and as high as 600 TAF may be required, depending on fish actions. Tier 3 assets may be required.

The following text describes how the EWA agencies would pursue water acquisitions as the year type unfolds. In all years, the EWA agencies would begin negotiating with willing sellers in the prior summer and fall, well in advance of knowing hydrologic conditions. In some cases, multi-year agreements, most involving options, would be in place. The purchases would be structured largely as described in Appendix E, EWA Acquisition Strategy for 2003, except that the EWA agencies anticipate more multi-year agreements.

The EWA agencies would negotiate options both upstream from the Delta and within the export service area to be able to maximize use of cross-Delta transfer capacity in the SWP's Banks Pumping Plant, which would be minimal in wet years, but would become more available in dry years when SWP allocations to contractors would be relatively low. Cross-Delta transfer capacity also would be influenced by the amount of water transfers originating Upstream from the Delta Region arranged by Project contractors, DWR, and the CVP. Holding option contracts would allow the agencies to maximize the purchase of less costly Upstream-from-the-Delta water when transfer capacity was available and would allow purchase of sufficient water from the export service area in wet years with limited transfer capacity.

[32] The Sacramento River Index classifies water years based on the unimpaired runoff from the Sacramento River system.

The EWA would lose an estimated 20 percent of the water obtained from the Sacramento River and its tributaries to carriage losses in the Delta. Water obtained from the San Joaquin River basin is subject to a 10 percent conveyance loss. However, the net cost of the water from the Upstream from the Delta Region water after losses would be less than assets from the export service area. Each year the carriage water loss allotment would be reevaluated.

2.4.3.1 Critical Year

In the driest years, the SWP would have a low water supply allocation to its contractors, probably in the range of 20 to 40 percent of requested amounts. The EWA would have significant cross-Delta transfer capacity available and would primarily seek upstream water. Stored reservoir water would be the first priority water source, followed in sequence by groundwater substitution, stored groundwater, and crop idling (rice). The priorities among source categories would remain the same in all year types.

In sequential dry and critical years, reservoir levels may be drawn down to the point that transfers of stored reservoir water to the EWA become unlikely or highly restricted. In such times, the EWA agencies would need to increase the emphasis on transfers involving groundwater substitution, groundwater purchase, and crop idling. The EWA agencies would be less likely to pursue crop idling transfers unless reservoir levels were lower than usual early in the winter.

As shown in Table 2-7, the maximum purchase target would be greatest for stored reservoir water, then groundwater substitution, groundwater purchase, and lastly crop idling, still in potentially significant amounts if reservoir water appeared limited. Stored groundwater purchase quantities would be minimal, largely due to limited availability north of the Delta.

The total purchase quantity would be relatively low in critical years, as Delta pumping would be low and operational curtailments would be less costly in terms of the pumping foregone that must be replaced by the EWA. EWA variable asset tools, however, would likely produce less water for the EWA in drier years.

2.4.3.2 Dry Year

In a dry year, SWP allocations would likely be in the 35 to 60 percent range. Cross-Delta transfer capacity available to the EWA may begin to be constrained at the upper range of these allocations, depending on runoff timing, competing transfers, and other operational factors. The EWA purchase target would be somewhat greater than in a critical year because operational curtailments would represent a larger reduction in Delta export pumping. The EWA agencies would pursue a strategy very similar to the critical year strategy, with most assets coming from the upstream from the Delta region. At higher SWP allocations, cross-Delta transfer capacity may become a constraint on the ability to move water from upstream when needed, and the EWA agencies may need to acquire water from the export service area as well.

As noted above, in sequential dry and critical years, reservoir levels may be drawn down to the point that transfers of stored reservoir water to the EWA would be unlikely or highly restricted. In such times, the EWA agencies would need to increase the emphasis on transfers involving groundwater substitution, groundwater purchase, and crop idling. Crop idling transfers would be less likely to be pursued unless reservoir levels were lower than usual early in the winter.

Acquisition target ranges would be about the same upstream from the Delta as for a critical year.

2.4.3.3 Below Normal Year

In a below normal year, the SWP allocation could range between from approximately 50 to 80 percent. In this range, the ability of the EWA to move water across the Delta would become more constrained, and at the higher allocations may become limited to the 500 cfs capacity dedicated to the EWA, or about 60,000 acre-feet, depending on runoff timing, competing transfers, and other operational factors. Purchase options play a key role in adjusting the locations where water would be purchased to match the cross-Delta transfer capacity as the SWP allocation would be established in the spring.

Because the water cost of operational curtailments would increase as SWP allocations and Delta pumping increase, the EWA's acquisition target would increase. Acquisitions can involve significant purchases from the upstream from the Delta region in the lower range of below normal year allocations, but at higher allocations the purchases would shift to the Export Service Area, where stored groundwater and crop idling play a major role. As previously stored groundwater is depleted by EWA purchases, the crop idling (cotton) source would become more important.

2.4.3.4 Above Normal Year

In an above normal year, the SWP allocation could range from approximately 70 to 90 percent. In this range, the ability of the EWA agencies to move water across the Delta may become limited to the 500 cfs of dedicated capacity, or about 60,000 acre-feet, depending on runoff timing and other operational factors. The EWA agencies would seek at least 75,000 acre-feet of stored reservoir water north of the Delta, exporting 60,000 acre-feet and providing an estimated 15,000 acre-feet (20 percent) for carriage water. If additional transfer capacity were available in that year, the EWA would seek additional water from stored reservoir supplies and groundwater substitution sources to fill the available capacity.

Water costs in some above normal years could exceed 300,000 acre-feet, possibly requiring Tier 3 purchases.

The water needed to cover operational curtailments at the Delta pumps would increase further in an above normal year, and the EWA's acquisition target would increase. The balance of needed assets would be obtained from banked groundwater and crop idling south of the Delta.

2.4.3.5 Wet Year

In the wet years, the SWP allocation would likely be at least 80 percent and in some years 100 percent. The cost of operational curtailments could become greater, especially if the wet hydrology brings fish into the vicinity of the pumps more often. Water costs in the wet years, possibly including Tier 3 purchases, could reach the upper limit selected for this alternative, 600,000 acre-feet.

In the wet years, the ability of the EWA agencies to move water across the Delta may become limited to its 500 cfs dedicated capacity, or about 60,000 acre-feet. The EWA agencies would seek at least 75,000 acre-feet of stored reservoir water from the upstream from the Delta region, exporting 60,000 acre-feet and providing an estimated 15,000 acre-feet (20%) for carriage water. If additional transfer capacity were available in that year, the EWA would seek additional water from stored reservoir supplies and groundwater substitution sources to fill the available capacity.

The balance of needed water would have to be sought from the export service area, through a substantial amount of crop idling and some stored groundwater. Some of the crop idling may have to be arranged after initial planting, when the consequences of the wet hydrology and fish behavior become more completely known. Only when it is necessary to purchase Tier 3 assets would the EWA agencies actually acquire the maximum quantity of water identified in the flexible purchase alternative.

2.4.4 Acquisition Strategy

The EWA agencies would acquire water using an acquisition strategy that meets multiple goals and objectives when acquiring water. These goals include:

- Acquire water at a unit cost that is most effective considering the benefits achieved;
- Protect assets by creating arrangements to carry over water between years;
- Continue coordination with other water purchase programs;
- Maximize the existing and future funding opportunities; and
- Improve flexibility by:
    - Expanding the types of purchases and the number of potential sellers;
    - Developing actions that continue for more than 1 year.

The Draft Final EWA Acquisition Strategy for 2003 is included in Appendix E. The sections below describe several components of the strategy that are relevant to assessing the environmental effects of the Flexible Purchase Alternative.

2.4.4.1 Tie Water Purchases to Hydrologic Conditions to Minimize Costs

The amount of water available for transfer is typically greater in areas upstream from the Delta than in the export service areas because more than 70 percent of runoff comes from northern California (DWR 1998). This difference is reflected in the market rates received by willing sellers in these two areas. The differences in water prices upstream from the Delta and the export service areas are greater than simply the costs of transporting water across the Delta. The differences reflect a structural difference in the water economies of these two areas.

Water from the areas upstream from the Delta is less expensive, but the EWA has limited conveyance capacity to convey water across the Delta in some hydrologic conditions. Therefore, the EWA would pursue a strategy in which it maximizes purchases from areas that are upstream from the Delta to the extent that it can convey water across the Delta.

Some water purchases in areas upstream from the Delta are generally less expensive, have fewer environmental effects, and are more flexible; therefore, the EWA Project Agencies would prioritize these types of acquisitions for purchase. The highest priority would be stored reservoir purchase, followed by groundwater substitution and stored groundwater purchase. The lowest priority would be crop idling transfers because of their increased environmental effects and decreased flexibility. In some cases (e.g. Sacramento River area idling transfers), the foregone consumptive use in April, May, and parts of June may not be effectively captured and exported by the EWA because the water must be released to meet downstream requirements, yet it cannot be pumped in the Delta.

Acquisitions in the export service area generally follow the same pattern: stored groundwater purchase is less expensive, more flexible, and has fewer environmental effects than crop idling transfers. Unfortunately, potential supplies in the export service areas are decreasing, and may not be available into the future. For purchases from the export service area, the EWA Project Agencies would prioritize stored groundwater purchases if available.

2.4.4.2 Continued Coordination with other Acquisition Programs

Other water acquisition programs would also acquire water in the same regions as the EWA, and some programs would seek to use this water to achieve similar goals. Coordination could help maximize environmental benefits of these programs and avoid cumulative effects.

2.4.4.3 Set Water Purchase Targets

With a high upper limit on the purchases for the Flexible Purchase Alternative, the EWA would try to set water purchase targets based on Management Agencies' predictions of fish needs for different year types. Setting these purchase targets before the EWA Project Agencies negotiate acquisitions would help in purchasing enough assets to meet fish needs.

2.4.4.4 Aggressively Use Purchase Options

The EWA Project Agencies could negotiate purchase options, in which they secure a contractual ability to call upon water to be transferred at a future date. Aggressive use of options upstream from the Delta would provide the EWA agencies flexibility to deal with changing hydrologic conditions. One concern related to options is that in many cases the call dates[33] needed by the sellers occur early in the year, before much is known about the hydrologic conditions. The EWA would seek option call dates as late into the year as possible, consistent with the needs of the sellers.

2.4.4.5 Increase Use of Multi-Year Transfers

The EWA Project Agencies could negotiate longer-term contracts with willing sellers to acquire water from the same source in multiple years. Multi-year agreements would likely decrease the cost of the water and improve flexibility by having a source that is available without additional negotiations.

2.5 Fixed Purchase Alternative

In the Fixed Purchase Alternative, the EWA agencies would make purchases as identified in the CALFED ROD, shown in Table 2-8. The EWA agencies could take the same types of fish actions identified in the No-Action/No Project and Flexible Purchase Alternatives, but the assets available would limit the magnitude of the actions. This alternative includes a conservative assumption whenever there is discretion to make a determination of functional equivalence[34] or where the CALFED ROD contemplates certain future actions (e.g., increased Upstream from the Delta purchases in future years). This alternative limits the EWA agencies to purchases of the 185,000 acre-feet identified in the CALFED ROD and would not use functional equivalency to adjust purchase location. Water purchases would be limited to the 185,000 acre-feet per year regardless of water year type. In this alternative, the volumes that the EWA agencies would purchase from each region would remain constant every year at 35,000 acre-feet upstream from the Delta[35] and 150,000 acre-feet in the export service areas. The Fixed Purchase Alternative has the benefits of variable assets, source shifting, and groundwater storage as described in the ROD. The EWA agencies would likely enact source shifting agreements more frequently in the Fixed Purchase Alternative than in the Flexible Purchase Alternative because of restricted purchase quantities. In this alternative, the EWA agencies would acquire variable assets at the same rate as in the Flexible Purchase Alternative.

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33 The "call date" is the last date that the EWA could call for the water.

34 The Operating Principles Agreement specifies methods for asset acquisition and management, but allows the Project and Management Agencies the ability to use methods that function in an equivalent manner.

35 The CALFED ROD included footnote 3 shown in Table 2-7, which indicated that Upstream from the Delta purchases may increase in subsequent years. The Fixed Purchase Alternative is fixing the Upstream from the Delta purchases, and this amount would not increase. The EWA agencies may, however, purchase additional water upstream from the Delta to account for carriage water requirements; the 35,000 acre-foot total would reflect the amount of water that reaches the Delta export pumps.

Actions taken by the EWA agencies in any given year under the Fixed Purchase Alternative would be limited to the availability of carryover assets from prior years, annual purchases of 185,000, variable assets, source shifting, and the capacity to borrow from the Projects based on the availability of groundwater storage.

The fixed upper limits on purchases would increase the probability that Tier 3 assets would be needed as part of the Fixed Purchase Alternative. The Fixed Purchase Alternative analysis only assesses the effects associated with purchases up to 185,000 acre-feet. If the EWA agencies used all these assets and jeopardy occurred, the Project Agencies would curtail pumping, but the EWA agencies would need supplemental environmental documentation before they could acquire water to compensate water users for these actions.

Table 2-8
EWA Tier 2 Assets in Accordance with the ROD

Action Description	***Water Available Annually (Average)*** [2]
SWP Pumping of (b)(2) ERP Upstream Releases[1]	40,000 acre-feet
Export/Inflow Ratio Flexibility	30,000 acre-feet
Purchases – Export service areas	150,000 acre-feet
Purchases – Upstream from the Delta[3]	35,000 acre-feet
Total	255,000 acre-feet
Storage acquisition	200,000 acre-feet of storage, filled; acquired in Year 1
Source Shifting agreement	100,000 acre-feet

(1) The EWA and the SWP will share equally the (b)(2) and ERP upstream releases pumped by the SWP after they have served their (b)(2) and ERP purposes.

(2) The amount of water derived from the first four actions will vary based on hydrologic conditions.

(3) For the first year, 35,000 acre-feet is targeted; higher amounts are anticipated in subsequent years.

Sections 2.5.1 and 2.5.2 discuss the actions that the Fixed Purchase Alternative could undertake to protect fish and the environment and the types of asset acquisition and management, respectively. Section 2.5.3 includes the environmental commitments, and Section 2.5.4 describes the EWA agencies' acquisition strategy for the Fixed Purchase Alternative.

2.5.1 Actions to Protect Fish and the Environment

Under the Fixed Purchase Alternative, the EWA agencies could take the following actions to protect fish and the environment: (1) reduce export pumping, (2) close the Delta Cross Channel gates, (3) increase instream flows, and (4) augment Delta outflow. These actions are described in more detail in Sections 2.3.1 and 2.4.1.

Because the Fixed Purchase Alternative limits the EWA agencies' asset acquisitions, the EWA agencies must prioritize fish actions and in many years only undertake the highest priority actions. In contrast to the other alternatives, which may use a variety of actions in multiple areas, the Fixed Purchase Alternative would focus on actions within the Delta; the primary action would be to reduce export pumping to help fish in the vicinity of the pumps. The Fixed Purchase Alternative includes less flexibility to engage in upstream actions; in most years, the assets available in this alternative would be entirely consumed by repayments for water not exported during pump

reductions. The EWA agencies would determine the frequency of pump reductions according to the fish behavior in that year and would take actions when they would most benefit the fish. In some years, the fish may not spend time near the pumps; therefore, the EWA agencies would not need to reduce pumping as often during such periods. In those years, the Fixed Purchase Alternative has the potential to provide the other benefits listed above.

2.5.2 Asset Acquisition and Management

The Fixed Purchase Alternative would include water acquisitions from the sources outlined in the CALFED ROD (Table 2-8). Within the Program area, the EWA Project Agencies have the option to choose from a number of sources. The EWA agencies could use any of the acquisition methods described below to purchase water. Flexibility to purchase from any of these sources is critical to helping the EWA run efficiently because it allows the Project Agencies to purchase the least expensive water available in any given year. Table 2-9 lists agencies that may be willing to sell water to the EWA or have sold water to the EWA in past years,[36] along with a general range of potentially available water volumes. None of the purchases in Table 2-9 are guaranteed; the EWA agencies could only make purchases if a willing seller wished to participate.

The numbers in Table 2-9 are estimates and do not necessarily reflect the amount of water that would be available in any given year. Generally, these estimates reflect the potential upper limit of available water in order to include the maximum extent of potential transfers in the environmental analysis. Some of the agencies listed in Table 2-9 indicated an interest in transferring water to the EWA, but could not provide a range of potential available water supplies. The numbers in the table include estimates provided either by water sellers or the Project Agencies. Actual purchases would depend on the year type and the amounts that sellers would be willing to transfer in a given year. These numbers vary from the Flexible Purchase Alternative because the Fixed Purchase Alternative includes 35,000 acre-feet upstream from the Delta and 150,000 acre-feet in the Export Service Area, so the upper limit of each individual transfer cannot exceed that cap.

The potential acquisitions in Table 2-9 would not all occur within a single year. The table is simply a menu that illustrates the flexibility the EWA has in making purchases. Figure 2-4 shows the locations of the agencies listed in Table 2-9. Section 2.4.2 provides detailed descriptions of the potential actions.

[36] Information on past EWA transactions can be found online at http://wwwoco.water.ca.gov/calfedops/2001ops.html or http://wwwoco.water.ca.gov/calfedops/2002ops.html

Table 2-9
Potential Asset Acquisition and Management for the Fixed Purchase Alternative (Upper Limits)

	Range of Possible Acquisitions (TAF)				***Management***	
Agency	***Stored Reservoir Water***	***Groundwater Substitution***	***Crop Idling/ Subst.***	***Stored Groundwater Purchase***	***Groundwater Storage Services***	***Source Shifting/ Pre-Delivery***
Upstream from the Delta Region						
Sacramento River Area of Analysis						
Glenn-Colusa ID		20-35	35			
Reclamation District 108		5	35			
Anderson Cottonwood ID		10-35				
Natomas Central MWC		15				
Feather River Area of Analysis						
Oroville Wyandotte ID	10-15					
Western Canal WD		10-35	35			
Joint Water Districts		20-35	35			
Garden Highway MWC		15				
Yuba River Area of Analysis						
Yuba County WA	35	35				
American River Area of Analysis						
Placer County WA	20		10			
Sacramento GW Authority				10		
Merced/San Joaquin River Area of Analysis						
Merced Irrigation District		10-25				
Export Service Area						
San Joaquin Valley						
Kern County WA			115	50-150	X	X
Semi-Tropic WSD[1]					X	
Arvin-Edison WSD[1]					X	
Westlands WD			150			
Tulare Lake Basin WSD			85			
Santa Clara Valley						
Santa Clara Valley WD						X
Southern California						
Metropolitan WD						X

Abbreviations:
GW: Groundwater
ID: Irrigation District
MWC: Mutual Water Company
WA: Water Agency
WD: Water District
WSD: Water Storage District
Footnote 1: Semi-Tropic WSD and Arvin-Edison WSD are within Kern County Water Agency. Their groundwater storage facilities are separate from the Agency, but they may participate in other programs that the agency helps administer, such as crop idling.

2.5.3 Acquisition Strategy

In the Fixed Purchase Alternative, the EWA agencies would negotiate water purchases using an acquisition strategy that meets multiple goals and objectives when acquiring water. These goals include:

- Acquire water at the most effective unit cost;
- Expand the asset base;
- Improve flexibility by developing actions that continue for more than 1 year;
- Protect assets by creating arrangements to carry over water between years;

- Continue coordination with other water purchase programs; and
- Maximize the effectiveness of CALFED program investments.

The elements of the strategy are similar to those discussed in Section 2.4.4 for the Flexible Purchase Alternative. The sections below summarize some of the strategy components relative to the Fixed Purchase Alternative.

2.5.3.1 Select Acquisitions That Minimize Costs

The EWA agencies would prioritize acquisitions that minimize costs and environmental effects. The highest priority would be stored reservoir purchase, followed by groundwater substitution and stored groundwater purchase. The lowest priority would be crop idling transfers because of their increased environmental effects and decreased flexibility.

Acquisitions in the export service area generally follow the same pattern: stored groundwater purchase is less expensive, more flexible, and has fewer environmental effects than crop idling transfers. The EWA Project Agencies would prioritize stored groundwater purchases.

2.5.3.2 Continued Coordination With Other Acquisition Programs

Other water acquisition programs would also acquire water in the same regions as the EWA, and some programs would seek to use this water to achieve similar goals. Thorough coordination could help maximize environmental benefits of these programs and avoid cumulative effects.

2.5.3.3 Increase Use of Multi-Year Transfers

The EWA Project Agencies could negotiate longer-term contracts with willing sellers to acquire water from the same source in multiple years. Multi-year agreements would likely decrease the cost of the water and improve flexibility by having a source that is available without additional negotiations.

2.6 Comparison of Three Alternatives

The three alternatives (No Action/No Project, Flexible Purchase, and Fixed Purchase) are summarized in Table 2-10.

2.7 Identification of the Environmentally Preferred Alternative

As described in the upcoming resource chapters, neither the Fixed Purchase Alternative nor the Flexible Purchase Alternative has potentially significant unmitigable impacts. The primary environmental delineator is the benefit produced by each alternative. The Flexible Purchase Alternative would include higher levels of asset acquisition, which would allow the EWA agencies to take more actions to benefit fish. The Fixed Purchase Alternative would include less asset acquisition;

therefore, the EWA agencies would have to prioritize actions to protect fish in the Delta and could take fewer actions to benefit fish.

Because the Flexible Purchase Alternative includes increased asset acquisitions, the EWA agencies could take more actions to benefit fish and would likely not reach Tier 3 very often. The Fixed Purchase Alternative would have an increased likelihood of reaching Tier 3, when uncompensated actions to protect fish may occur. Both alternatives increase water supply reliability over the No Action/No Project Alternative, but the Fixed Purchase Alternative would not be as reliable because of the increased potential of uncompensated Tier 3 actions.

The Flexible Purchase Alternative is the environmentally preferred alternative because of the increased benefits it would provide and because it has no significant unmitigable impacts. The benefits to aiding in the recovery of at-risk native fish species populations are described in more detail in the upcoming resource chapters.

Table 2-10
Comparison of Alternatives

	No Action/No Project	***Flexible Purchase Alternative***	***Fixed Purchase Alternative***
Regulatory Baseline	Project operations would be limited and guided by regulatory baseline that includes; D-1641, (b)(2), Biological Opinions, 1986 COA, other SWRCB Orders, USACE flood control, and FERC requirements.	No change in the regulatory baseline.	No change in the regulatory baseline.
Pump Reductions	Fish actions would be limited to curtailments taken after anticipated incidental take threshold is reached. Curtailments would be limited to quantity necessary to avoid reaching red light (a lower standard).	Fish actions would be taken prior to "take" thresholds and to provide additional environmental support. Magnitude and duration of reductions would be met by available supplies. Larger available supplies would support a more rapid trajectory to recovery	Fish actions would be taken prior to "take" thresholds being reached. Magnitude and duration of curtailments taken to support recovery (a higher standard) would be limited by available supplies.
Delta Cross Channel Gates Delta Cross Channel Gates (continued)	DCC gates would be closed during the time periods dictated by the regulatory baseline, including CVP operating standards and D-1641.	DCC gates could be closed more than with the No Action/No Project. Available assets to pay back users affected by closure would limit the additional closures (600,000 acre-feet plus variable assets).	DCC gates could be closed more than with the No Action/No Project. Available assets to pay back users affected by closure would limit the additional closures (185,000 acre-feet plus variable assets).

Table 2-10
Comparison of Alternatives

	No Action/No Project	***Flexible Purchase Alternative***	***Fixed Purchase Alternative***
Instream Flows	No incremental benefits would accrue. Projects would be operated according to regulatory baseline.	Upstream purchases would provide additional flows in both Project and non-Project controlled streams. Releases would be scheduled to benefit where possible and, at a minimum, have no negative effects. The magnitude of potential benefits would vary between rivers but would be limited by the volume of upstream purchases moved during the transfer window, which could be up to 600,000 acre-feet.	Upstream purchases would provide additional flows in both Project and non-Project controlled streams. Releases would be scheduled to benefit where possible and, at a minimum, have no negative effects. The magnitude of potential benefits would vary between rivers but would be limited by the volume of upstream purchases moved during the transfer window, which could be up to 35,000 acre-feet.
Water Purchases	Water users could be active in the water market to replace some or all water supplies lost in years when uncompensated water supply reductions occur because of modification to Project operations to protect at-risk species. Potential sellers and sources of water would be the same as those identified in this EIS/EIR. Other State and Federal water purchase programs would also participate in the water market. Water users would rely more on groundwater and would be more involved in water markets purchasing supplies in years that it would be needed to replace uncompensated cuts.	EWA would purchase up to 600,000 acre-feet, if needed. Normal EWA purchases in the 200,000 to 300,000 acre-foot range. Sources would not be specified, but would depend on location of sellers, economics, hydrology, conveyance capacity, and other factors.	EWA would purchase 185,000 acre-feet annually. This quantity would be equal to the fish actions, less assets from Delta operational flexibility. Sources would not be specified, but would depend on location of sellers, economics, hydrology, conveyance capacity, and other factors.
Functional Equivalency	Would not exist	Broadly defined. This alternative would use the functional equivalency principle from the ROD to make purchases from a different mix of sources. EWA agencies would have flexibility to scale upstream from the Delta purchases to available conveyance capacity in the Delta by water year. This would help the EWA agencies accomplish more with fixed budgets, but would use conveyance capacity that might otherwise be available to others.	Narrowly defined. Geographic distribution of purchases would follow those described in the ROD. Cost of water in export service areas in dry years would be high.
Sharing (b)(2) & ERP	SWP would receive full benefit of (b)(2) and ERP that CVP cannot capture.	Half of yield would be dedicated to EWA.	Half of yield would be dedicated to EWA.

Table 2-10
Comparison of Alternatives

	No Action/No Project	***Flexible Purchase Alternative***	***Fixed Purchase Alternative***
JPOD	Transfers by SWP contractors to replace supplies lost because of uncompensated cuts would have priority over all others for use of Banks Pumping Plant capacity. The remaining capacity would be available to CVP and other non-SWP contractors.	Capacity would be given to EWA as defined in Operating Principles Agreement. Use of opportunity during excess conditions would be important. Use during balanced summertime conditions would be limited to half of the available capacity, unless the CVP did not choose to use its share of capacity. Capacity available to CVP and non-SWP contractors would be reduced by the volume of upstream purchases by EWA.	Capacity would be given to EWA as defined in Operating Principles Agreement. Use of opportunity during excess conditions would be important. Use during balanced summertime conditions would be limited by the volume of upstream purchases or carryover water in upstream storage facilities. Upstream purchases would be limited to 35,000 acre-feet, which would be able to be pumped by the 500 cfs increase at Banks Pumping Plant (see below).
500 cfs Summer Conveyance Capacity	Used by DWR to replace uncompensated cuts for fish. Requires increased summer releases from Oroville to support exports unless water was held back in Oroville during pumping curtailments.	Capacity would be given to EWA. EWA would need to support exports with upstream purchases. Use would not be limited to years when SWP uses all available permitted capacity. EWA could also use in any year that upstream purchases exceed half the capacity available under JPOD.	Capacity would be given to EWA. EWA would need to support exports with upstream purchases. Use would be limited to years when SWP uses all available permitted capacity. The EWA would use this capacity when all purchased EWA water cannot be moved through the Delta within the EWA's share of the otherwise permitted capacity at Banks Pumping Plant.
E/I Relaxation	E/I relaxation would be available to Projects as potential tool to replace uncompensated cuts, if the Management Agencies approve.	Yield would be dedicated to EWA.	Yield would be dedicated to EWA.
Source Shifting	Could occur as a result of uncompensated cuts.	Would be used as a tool by EWA to prevent the EWA from aggravating low point water quality problems in San Luis Reservoir. Not restricting purchase quantities could result in less frequent use of source shifting. Purchasing greater quantities in export service areas could reduce frequency of the need to use by providing water prior to low-point.	Would be used as a tool by EWA to prevent the EWA from aggravating low point water quality problems in San Luis Reservoir. Restricting purchase quantities could result in more frequent use of source shifting. Purchasing greater quantities in export service areas could reduce frequency of the need to use by providing water prior to low-point.

Table 2-10 Comparison of Alternatives			
	No Action/No Project	**Flexible Purchase Alternative**	**Fixed Purchase Alternative**
Tier 3	Would not exist	Would be used only if EWA assets were not available and continued Project operations would jeopardize species. Flexible purchasing could reduce frequency that Tier 3 is needed. This alternative includes purchases up to 600,000 acre-feet, so additional Tier 3 acquisitions would be covered if they combine with other EWA acquisitions to total less than 600,000 acre-feet.	Would be used only if EWA assets were not available and continued Project operations would jeopardize species. Limiting purchases could lead to greater frequency that Tier 3 is needed. This alternative does not include acquisitions for Tier 3 (over 185,000 acre-feet), so EWA agencies would need to complete additional documentation if purchases for Tier 3 exceeded 185,000 acre-feet.

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